*RIO DE JANEIRO DENTAL JOURNAL*

# REVISTA CIENTÍFICA DO CRO-RJ

revcientifica.cro-rj.org.br

**Editors-in-Chief**
**Lucianne Cople Maia**
**Andréa Fonseca-Gonçalves**

**Volume 4 - Nº3**
**September - December, 2019**

ISSN 1518-5249
e-ISSN 2595-4733

IMAGEM FREEPIK

CRO RJ

The official journal of the
Conselho Regional de Odontologia do Rio de Janeiro

# REVISTA CIENTÍFICA DO CRO-RJ (RIO DE JANEIRO DENTAL JOURNAL)





**MAIL/CORRESPONDÊNCIA**
All mail shoud be sent to revistacientifica@cro-rj.org.br
Toda correspondência deve ser enviada à Secretaria no endereço abaixo:
revistacientifica@cro-rj.org.br

ISSN (print): 1518-5249
e-ISSN 2595-4733

CONSELHO REGIONAL DE ODONTOLOGIA DO RIO DE JANEIRO
REVISTACIENTÍFICADOCRORJ(
RIODEJANEIRODENTALJOURNAL)
Rua Araújo Porto Alegre, 70, 5º andar, Centro, Rio de Janeiro-RJ - Cep 20030-015 • Tel. (21) 3505-7600. - Site: www.cro-rj.org.br
**Graphic Design**: Claudio Santana
**Librarian**: Vinicius da Costa Pereira
**Trainee Librarian**: Aline Chahoud e Jefferson Igor da Silva Farias
**Information Technology Intern**: Moisés Limeira e Paulo Felippe
**Available on**: www.revcientifica.cro-rj.org.br
2018 - Conselho Regional de Odontologia do Rio de Janeiro

# Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal)

## Volume 4, Number 3


**Summary**
**Contents**

## Editorial



## Original Article



## Case Report

# THE ROLE OF DENTAL SURGEONS ON PATIENT CARE WITH REGARDS TO POTENTIALLY MALIGNANT DISORDERS AND ORAL CANCER

In order to understand how dentists should act when approaching patients that can present with cancer or pre-cancer of the oral cavity, it is adamant that the professionals familiarize themselves with the current trends of oral cancer and potentially malignant disorders. A study conducted only three years ago pinpointed that squamous cell carcinoma of the head and neck has a five-year survival rate of only 40 to 60% in fifty years, despite advances in surgical techniques, radiotherapy, chemotherapy and combined therapies.[1] In order to avoid these terrible statistics, a great effort must be made by medical professionals, especially those that constantly examine the oral cavity, also known as: dentists.

A common misconception usually observed within our professional class is that oral cancer only happens in older, smoker, drinker and male patients. The incidence of oral cancer, especially cancer of the mobile tongue and oropharynx, increased significantly in the United States of America between 1973 and 2012, in younger patients of both genders.[2] It is not wrong to assume that oral cancer (tongue cancer being the most common affected site) in Brazil still affect more men over 50 years of age, with low education levels and advanced staged disease at the time of diagnosis.[3] Nevertheless, even in Brazil, the rising quantity of cases of oral cancer in woman under 45 years old at the private practice is notable, especially in white women, which coincides with the finding of Tota and collaborators in the United States.[2]

Several changes were noted in Chapter 4 regarding tumors of the oral cavity and tongue, in the fourth edition of the World Health Organization (WHO) Classification of Tumors of the Head and Neck. This chapter excluded the oropharynx, which is now depicted as an independent chapter that recognizes the uniqueness of oropharyngeal tumors (most of the times, but not always HPV related) as well as those of the oral cavity.[4]

The biggest challenge of all is to understand what is causing this shift in oral cancer. Developed countries are looking at a drastic reduction of the traditional tobacco related oral cancer in older men and many cases of oral cancer at younger adults do not have HPV involvement. This is the million-dollar question of the moment for the scientific community to answer.[5]

Last but not least, pigmented lesions of the oral cavity should always be investigated (anatomic pathology) after they are identified during the physical exam, given the risk of mucosal melanoma within the differential diagnosis, which could evolve from a melanocytic nevus. Besides the greatest advances of target therapy and immunotherapy,[6] we have recently shown that mucosal melanomas located in lips and oral cavity have 2 times more risk of early death, not to mention the higher risk of metastatic disease related to mucosal melanomas in general.[7] The final message for all general practitioners is that most pigmented, white or red lesion that lasts for more than two weeks should undergo biopsy for further investigation, performed under the supervision of an experienced oral medicine practitioner.

## REFERENCES


1. Moy JD, Moskovitz JM, Ferris RL. Biological mechanisms of immune escape and implications for immunotherapy in head and neck squamous cell carcinoma. *Eur J Cancer*. 2017;76:152-166. doi:10.1016/j.ejca.2016.12.035

2. Tota JE, Anderson WF, Coffey C, et al. Rising incidence of oral tongue cancer among white men and women in the United States, 1973–2012. *Oral Oncol*. 2017;67:146-152. doi:10.1016/j.oraloncology.2017.02.019

3. Cohen Goldemberg D, de Araújo LHL, Antunes HS, de Melo AC, Santos Thuler LC. Tongue cancer epidemiology in Brazil: incidence, morbidity and mortality. *Head Neck*. 2018;(October 2017). doi:10.1002/hed.25166

4. Müller S. Update from the 4th Edition of the World Health Organization of Head and Neck Tumours: Tumours of the Oral Cavity and Mobile Tongue. *Head Neck Pathol*. 2017;11(1):33-40. doi:10.1007/s12105-017-0792-3

5. Miller C, Shay A, Tajudeen B, Sen N, Fidler M, Stenson K. Clinical features and outcomes in young adults with oral tongue cancer. *Am J Otolaryngol*. 2019;40(1):93-96. doi:10.1016/j.amjoto.2018.09.022

6. Goldemberg DC, Thuler LCS, de Melo AC. An Update on Mucosal Melanoma: Future Directions. *Acta Dermatovenerol Croat*. 2019;27(1):11-15. http://www.ncbi.nlm.nih.gov/pubmed/31032785.

7. Cohen Goldemberg D, de Melo AC, de Melo Pino LC, Thuler LCS. Epidemiological profile of mucosal melanoma in Brazil. *Sci Rep*. 2020;10(1):1-7. doi:10.1038/s41598-019-57253-6



**Daniel Cohen Goldemberg**

*Stomatologist (UFRJ, oral pathologist and PhD in Oral Pathology at the University College London (UCL) - University of London in collaboration with the Public Health England (PHE) - London, UK*
*Pathology lecturer at UniSãoJosé*
*Substitute head of the multiprofessional residency program in dentistry and researcher at INCA*
*Clinical Research Division - National Cancer Institute / COPQ /INCA*
*Rua André Cavalcanti, 37 - 5º andar - Anexo - Centro*
*Rio de Janeiro - Brazil*
*daniel.cohen@inca.gov.br*

# EVALUATION OF THE SUCCESS RATES OF IMMEDIATE IMPLANT PLACED IN ANTERIOR AND POSTERIOR REGIONS: A RETROSPECTIVE STUDY

Rodrigo Ramos Silveira **Lucas**[1], Cintia Carneiro Pinheiro **Martins**[1], Henrique Eduardo **Oliveira**[1], Bruno Queiroz da Silva **Cordeiro**[1], Aldir Nascimento **Machado**[1], Priscila Ladeira **Casado**[1*], Telma Regina da Silva **Aguiar**[1], Gilson Coutinho **Tristão**[1]

[1]Department of Dental Clinic, School of Dentistry, (UFF) Fluminense Federal University, Niterói, RJ, Brazil.

**Palavras chaves**: Implante Imediato. Alvéolo Fresco. Índice de Sucesso.

**RESUMO**

**Introdução:** A utilização de implante imediato em regiões posteriores tem apresentado resultados contraditórios. **Objetivo**: O objetivo deste estudo foi comparar o índice de sucesso e previsibilidade à curto prazo de implantes imediatos instalados em regiões anterior e posterior. **Métodos:** Um total de 1000 prontuários foram analisados, dos quais 43 foram incluídos neste estudo: Anterior (n=20) e posterior (n=23). Os critérios de inclusão foram: Indicação de extração dentária, instalação de implantes imediatos unitários, no mínimo doze meses de segmento com implante funcional. Os critérios de sucesso foram baseados na escala de saúde dos implantes dentários do Congresso Internacional de Implantologia Oral, eixo I. e II.: ausência de dor, ausência de mobilidade, ausência de exudato e perda óssea de até 4 mm. Valor de p<0.05 foi considerado estatisticamente significante. **Resultados:** O índice de sucesso dos implantes imediatos foi de 97,7% para implantes em função por pelo menos 12 meses. O uso de biomaterial (p=0,03) e prótese provisória (p<0,0001) foi significantemente maior em região anterior. Não foi encontrado diferença significante quanto a falha dos implantes comparando os dois grupos (p=0,47). Não houve diferença estatisticamente significante entre os grupos, considerando a idade, gênero, motivo da extração, torque inicial, tempo de tratamento e tipo de plataforma do implante (p>0,05). **Conclusão:** Pode-se concluir que as regiões anterior e posterior apresentaram alta taxa de sucesso a curto prazo quanto a técnica de implante imediato.

**Keywords**: Immediate Implants. Fresh Socket. Success Rate.

**ABSTRACT**

**Introdution:** Immediate implants placement has shown contradictory results in the posterior region. **Objective:** The aim of the study was to compare the success rate and predictability of the short-term treatment using immediate implants in anterior and posterior regions. **Methods:** A total of 1000 dental charts were analyzed, of which 43 were included in the study: anterior (n=20) and posterior (n=23). The inclusion criteria were: tooth extraction indication, immediate single-tooth implant placement and at least twelve months of follow-up with functional implant. The success rates were based on the criteria I. and II. from the health scale for dental implants proposed at the International Congress of Oral Implant Dentistry: no pain; no mobility, until 4 mm of bone loss, no exudate. *P*-value <0.05 was considered significant. **Results:** The total success rate of immediate implants was 97.7% for immediate implants in function for at least 12 months. The use of biomaterial (p=0.03) and temporary prosthesis (p<0.0001) were significantly higher in the anterior group. There was no significant difference in implant failure between groups (p=0.47). There was no statistical difference between the groups, considering age, sex, extraction reason, initial torque immediately following implant placement, treatment time and implant platform type (p> 0.05). **Conclusion:** It may be concluded that the anterior and posterior regions present a high short-term success rate when the immediate implant technique was used.

Submitted: May 11, 2019
Modification: October 4, 2019
Accepted: October 7, 2019

***Correspondence to:**
Priscila Ladeira Casado
Address: Mario Santos Braga Street, 28 - Centro - Niterói – RJ – Brazil.
Zip code: 24020-140
Telephone number: +55 (21) 2629-9920
E-mail: priscilacasado@id.uff.br

# INTRODUCTION

The success of osseointegrated implants in daily practice derives from the research of Professor Per Ingvar Branemark who, after his prospective and multicentric studies, contributed to the predictability of these devices as success rates were above 90%,[1-4] making most rehabilitation cases of edentulous areas and replacement of teeth indicated for extraction[5] a reality and the first choice in implant dentistry based on his concept of osseointegration.[6,7]

Post-extraction bone resorption is critical during the first six months and it occurs both in the bucco-lingual and apical-coronal directions.[8] Studies that observed alveolar remodeling, using radiographic image subtraction, study models and linear radiographs, have found bone loss of up to 50% in the bucco-lingual area during the first twelve months following extraction[9] of which 2/3 occur in 3 months.[8] In the anterior maxillary region, bone loss is greater in the buccal region, making the esthetics more difficult.[10]

Within this context, implant dentistry has developed the technique of immediate implant placement following tooth extraction that consists of using the remaining bone walls to insert the implant in a way that 3 to 5 mm exceeds the apical limit of the alveolus, with the purpose of achieving primary stability and preserving the bone structure.[11-13] Although this technique does not prevent bone resorption, it may decrease its extent. [11-13]

The advantages when choosing immediate implants include reduction of time and cost of rehabilitative treatment, lower morbidity, patient satisfaction, and improved esthetic results.[14-17]

However, the following technical and biological factors should be considered when opting for immediate implant placement following extraction: morphology of the bone defect and favorable three-dimensional positioning of the implant, time of surgery for implant placement, presence of acute infection, reason for tooth extraction, thickness of buccal alveolar wall, skill of surgeon, and achievement of primary stability.[10,14,18,19]

Ten to fourteen days after implant placement, a process of immature trabecular bone formation adjacent to the implant begins, culminating with the achievement of secondary or biological stability that, despite lower mechanical competence, offers high resistance for early implant loading.[20] The process of osseointegration is complete in 2 and 3 months, showing a high degree of mineralization of mature bone formation.[6,21]

However, despite advances and predictability of this technique, studies point to a higher risk of infection or failures in immediate implant procedures and it is considered a complex technique with high risks if the criteria for case selection and planning are not respected[8,22] such as in cases where implants are placed more buccally or when the bone wall is thin or damaged, or cases of thin gingival biotypes.[23,24]

In addition, some studies[25,27] question the use of the technique in the posterior region due to the low quantity and poor quality of bone (especially in the maxilla), greater occlusal forces that affect the area, and proximity to anatomical structures (maxillary sinus or mandibular canal), which hinder the achievement of primary stability.

In clinical practice in implant dentistry, many cases of immediate implant placement show a high success rate in the anterior region and contradictory results in the posterior region, considering a prognosis. [25,28,29]

Therefore, the purpose is to increase the treatment prognosis with implants placed in fresh alveoli, furthering knowledge on the use of this technique in the posterior region. Thus, the aim of the study was to compare the success rate and predictability of the short-term treatment using immediate implants in the anterior and posterior regions of the oral cavity. Our hypothesis is that there is no difference in success rates between regions.

# MATERIALS AND METHODS

This is a retrospective research that was submitted and approved by the Research Ethics Committee of the School of Medicine of the Fluminense Federal University, Rio de Janeiro, Brazil, under report No 1,779,121, October 17, 2016.

## Sample

A total of 1000 dental charts from the Specialization Course in Implant Dentistry of the Fluminense Federal University were analyzed, of which 250 dental charts described tooth extraction and immediate implant procedures.

Of these, 45 dental charts were selected according to the following inclusion criteria: cases of indication for extraction followed by immediate placement of single-tooth osseointegrated implants into the alveolus, submitted to implant surgery, and at least twelve months of follow-up with implant in function, from 2003 to 2013.

Patients who did not receive implants placed into the alveoli or those receiving multiple prostheses (such as protocol-type and overdenture prosthesis) were excluded from the study.

However, 2 cases of anodontia of permanent dentition with immediate implant placement after deciduous extraction were also excluded. Thus, a total of 43 dental charts were included in this study.

The following data were collected from the dental

charts: age, sex, number of tooth extracted, extraction reason, date of surgery, type and sizes of implant, torque obtained, use and type of biomaterial, use and type of temporary prosthesis, date of placement of definitive prosthesis.

The health scale for dental implants proposed at the International Congress of Oral Implant Dentistry,[30] in Pisa, 2008, was used as a criterion for implant success or failure in our analysis. The clinical criteria included in this scale are: I. Success (no pain; no mobility, < 2mm bone loss, no exudate) II. Satisfactory Survival (no pain, no mobility, 2-4mm bone loss, no exudate); III. Compromised Survival (possible sensitivity, no mobility, > 4mm bone loss, probing depth > 7mm and history of exudate); IV. Failure (pain, mobility, radiographic bone loss greater than half its length, uncontrolled exudate, or if the implant is no longer in mouth). In this study we considered implant success according to criteria I and II for the scale of health.[30]

## Statistical analysis

Numerical variables were represented as mean and standard deviation. The Shapiro-Wilk test for the normality of the distribution and Student's-t test were used. The nominal variables were compared using the Pearson chi-square test. P-values lower than 0.05 were considered statistically significant. All analyses were performed in the GraphPad Prism 7.0 software.

# RESULTS

Of the 1000 dental charts analyzed from the Clinic of the Specialization Course in Implant Dentistry of the Fluminense Federal University, 43 cases of immediate implant placement that met the inclusion criteria of the study were identified, 20 in the anterior region and 23 in the posterior.

The mean age of the patients was 47.83 ± 10.83 years, of which 29 were women and 14 men, with implant in function for at least 12 months. The most common cause of dental extraction was tooth fracture (22 cases - 51.1%) (Figure 1 and Figure 2), of which 33 (76.7%) were maxillary implants and 10 (23.3%) mandibular implants. Thirty-eight implants were of the external hexagon type (88.4%) (Figure 3), 4 (9.3%) cone morse implants and 1 (2.3%) internal hexagon implant (Conexão Sistema de Próteses, São Paulo, Brazil), with lengths ranging from 10mm to 13mm.

The mean torque achieved during immediate implant placement was 41.97 ± 12.54 N, all implants achieved primary stability.

Biomaterial was used to fill the alveolar implant gap in 26 sites (60.5%), with predominance of: Osteogen® (Intra-Lock, São Paulo, Brazil) in 16 cases (37.2%), Bioss® (Geistlich Pharma do Brasil, São Paulo, Brazil) in 3 cases (7%), Alobone® (Osseocon Biomateriais, Rio de Janeiro, Brazil) in 2 cases (4.6%), GeniOx® (Baumer, São Paulo, Brazil) Brazil) in 1 case (2.3%), Osteosynt® (Eincobio, Minas Gerais, Brazil) in 1 case (2.3%), and autogenous grafts from the intra-oral region in 2 cases (4.6%).

A temporary prosthesis was used only in the anterior region, representing 100% of the cases in this region, with only 1 (5%) being an immediate loading case with an anchoring provision in the implant itself. Partial removable prostheses were used in 18 (90%) cases and a temporary adhesive fixed prosthesis in 1 case (5%).

The total time of evaluation after implant placement was 6 ± 2.23 years after implant placement. The success rate of immediate implants at the Clinic of Implant Dentistry of the Fluminense Federal University, over the course of 12 months with implant in function was 97.7%.

For comparative analysis of the success rate in the anterior and posterior regions, the placement of immediate implants was divided into two groups: anterior (n = 20) and posterior (n = 23). The analysis of the differences between the groups studied is shown in Table 1.

There was no statistical difference between the groups, considering age, sex, extraction reason, initial torque immediately following implant placement, treatment time and implant platform type (p> 0.05).

Considering the type of implant, although the EH type was predominant in both groups, there was a higher incidence of MC (p=0.05) in the group that received immediate anterior implants.

The use of biomaterial during the surgical procedure as well as the temporary implants (p <0.0001) was significantly higher in the anterior group than in the posterior group (p = 0.03). However, considering the success rate in both groups, there was no statistically significant difference in implant failure (p = 0.47).

Only 1 case of implant loss was reported, in a patient showing bruxism during the anamnesis and that received a regular platform EH immediate implant after tooth fracture, without the use of biomaterial, and with provisional removable temporary prostheses. The implant length was 10 mm and it showed mobility after prostheses rehabilitation.

***Table 1**: Results comparing the anterior and posterior regions.*

| | Anterior N=20 | Posterior N=23 | *p*-value |
|---|---|---|---|
| **Age** | 45.85 ±10.69 | 49.39 ±10.73 | 0.14 |
| **Sex** | | | |
| Women | 13 | 16 | 0.50 |
| Men | 7 | 7 | |
| **Extraction reason** | | | |
| Frature | 13 | 9 | 0.11 |
| Endodontic failure | 2 | 4 | |
| Caries | 4 | 3 | |
| Periodontitis | 1 | 7 | |
| **Type of Implant[a]** | | | |
| MC | 4 | 0 | **0.05** |
| EH | 16 | 22 | |
| IH | 0 | 1 | |
| **Implant plataform** | | | |
| Regular | 18 | 23 | 0.21 |
| Narrow | 2 | 0 | |
| **Torque (N)** | 40.5 ±9.98 | 46.23 ±14.02 | 0.23 |
| **Region** | | | |
| Maxilla | 20 | 13 | **<0.0001** |
| Mandible | 0 | 10 | |
| **Biomaterial** | 16 | 10 | **0.03** |
| **Temporary Implant** | 19 | 1 | **<0.0001** |
| **Time of pre-prosthesis (months)[b]** | 9.31 ± 6.42 | 13.18±11.99 | 0.10 |
| **Implant failure** | 1 | 0 | 0.47 |

***Note**: [a]MC: Morse cone; EH: external hexagon; IH: internal hexagon; [b]time interval between implant placement and prosthesis.*

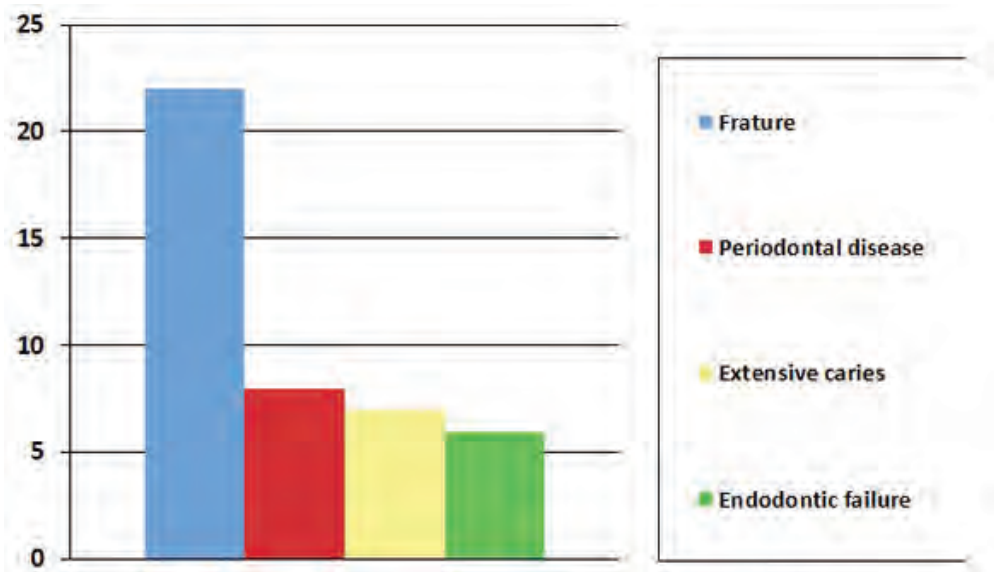


***Figure1**: Reasons for indication for extraction in the studied population (in absolute numbers).*

***Figure 2**: Indication for extraction due to fracture (red arrow) of tooth 22.*

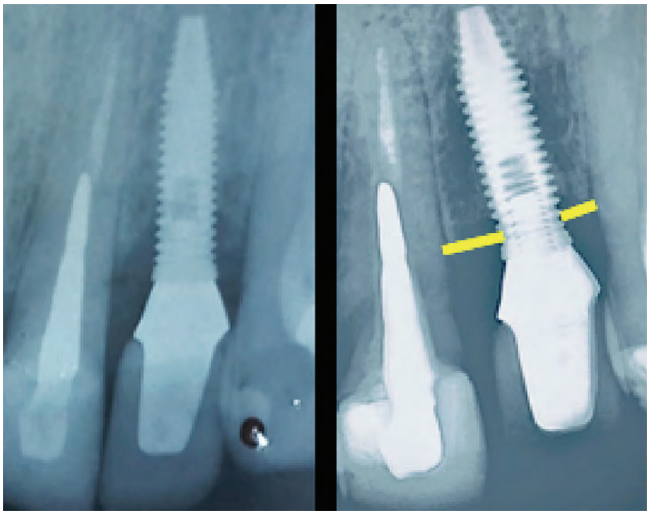

***Figure 3**: External-hexagon immediate implant placed in the area of tooth 22 (patient from Figure 2). This X-ray represents the image immediately after implant placement (left) and 2 years after healing (right) showing the saucerization around external hexagon implant and the level of bone formation.*

# DISCUSSION

When considering the therapeutic choice for replacing a tooth indicated for extraction, some factors should be taken into consideration such as: bone preservation, esthetic result, lower morbidity and greater predictability. The option for immediate implant procedure is well established in the literature,[31] but there is debate regarding the technique protocol, as well as the success rates according to the region of the implant placement.

This study did not identify a significant difference in the use of immediate implants into the alveoli in the anterior or posterior regions, comparing, characterizing and, above all, evaluating the longevity of the technique over the course of 12 months.

Modern implant dentistry has been primarily focused on the rehabilitation of partially or completely edentulous patients.[2,3] At present, there is a large influx of patients at clinics in need of tooth replacements. This is a great opportunity for the clinician to decide which moment is the best for implant placement following tooth extraction.[14,31] The therapeutic choice for immediate implant placement to replace a tooth indicated for extraction is good and safe[32] with high success rates in the scientific literature that range from 92.7% to 98.0%,[8,13,15] reported mainly in the anterior region. Our retrospective study corroborates these data showing a survival rate of 97.7% of implants in the anterior and posterior region after at least 12 months following implant placement.

Interestingly, despite contradictory literature,[25,33,34] considering rehabilitation with immediate implant in the posterior region, the success rate among the regions studied was similar in our study and the only case of implant loss occurred in the anterior region after 2 months.

The failure rate for single implants is low in the literature, from 1 to 2.4%, both in early and late failure of implant placements, including in the molar area.[12,13] The minimum follow-up of 12 months after implant is in function seems adequate and sufficient for this analysis regarding the survival of the implant.[34,35] Therefore, in our study, a follow-up of at least 12 months after implant placement was performed, reinforcing the predictability not only of the immediate implant placement in the anterior and posterior regions, but also when the implant is in function.

However, correct planning, considering the site and its anatomical defects, is important for the viability and survival of the immediate implants [8]. In a tomographic evaluation of the thickness of the buccal wall of teeth in the anterior maxillary region, Braut et al.[36] observed that, in most cases, thickness was less than 1mm at the crest level (62.9%) and at the middle of the root (80.1%). The study by Cooper et.al [37] showed that implant surgery of 15 patients (21%) out of 73 patients were canceled due to anatomical conditions (bone loss, dehiscence and fenestrations in the buccal wall).

Recently, Garcia e Sanguino[38] suggested a protocol for the diagnosis and selection of cases for immediate implants, pointing out 5 key points: presence of buccal wall, achievement of primary stability, conical implant design, atraumatic surgery, gap filling and favorable gingival biotype. In addition, whenever possible, temporary crowns

attached to the implant is recommended to favor the tissue profile. [37]

In our study, only the cases of immediate implant placement following extraction and rehabilitation with single prostheses in function for a minimum period of twelve months were considered. Thus, a small number of cases of immediate single-tooth implants were selected (43 cases). Furthermore, our sample was homogeneous regarding age, sex, extraction reason, initial torque following immediate implant placement, treatment time, and type of implant platform, reinforcing our finding of short-term results.

The causes for tooth extraction and consequent replacement by immediate implant were most frequently due to tooth fracture, followed by periodontal bone loss, extensive caries and endodontic failure, corroborating the current literature that reports dental fracture and periodontal impairment as the main causes for tooth extraction.[15]

Primary stability (measured in Ncm) has been cited as one of the fundamental requirements for immediate implant loading with values ranging from 30 to 40 Ncm in the literature.[23] In our study, this prerequisite was respected, mean torque being of 41.97 ± 12.54 N, which may explain the positive result and implant clinical success.

The selected implant sizes were based on the available anatomical space,[14] respecting the distances of the neighboring teeth or implants, distance from the buccal wall (2mm), and achievement of primary stability, exceeding the apical limit of the alveolus in 3-4mm in anterior region, which explains the choice for implants with a length equal to or greater than 10mm.

Although esthetics was not assessed in this study, there is literature evidence that a more significant esthetic result is achieved when the immediate implant receives immediate restoration, providing adequate peri-implant tissue regeneration and patient satisfaction.[38] De Rouck et al.[39] concluded that the immediate implant without restoration causes 2 to 3 times more gingival recession than the immediate implant with immediate restoration.

In a retrospective study of immediate implants following extraction using 800 dental charts, Bassi et al.[40] found 197 immediate implants and only 27.4% of them were rehabilitated with single-tooth implants, that is, 54 cases, which is in agreement with our study.

It is recommended that posterior implants do not receive occlusal loads during bone healing, [41] which was respected by the Clinic in Implant Dentistry, explaining the non-reporting of immediate loading in the posterior region and a temporary removable prosthesis only in one region.

Parafunctional habits such as bruxism and teeth clenching are highly related to failure in implant therapy as they generate forces that affect the cervical region, which may lead to resorption of the bone crest.[41] In our study it was observed that the only case of implant loss was of a patient who reported having bruxism during the anamnesis.

The site with the highest indication for immediate single-tooth implants was the anterior maxillary region (20 cases or 46.5%). This higher prevalence may be due to this region being considered an esthetic area, which involves greater patient demand and professional effort to restore, briefly, esthetics and function.

The absence of immediate implants in the anterior mandibular region is justified by the fact that immediate implants in this area, in all cases of our sample, require multiple or total rehabilitation, such as protocol-type or overdenture prosthesis, and thus these were excluded.

The present results emphasize a similar distribution among implants in anterior and posterior sites, reinforcing studies that showed indistinctness for indication and results between these areas.[42]

Some studies have failed to prove that filling the gap with biomaterial is effective to prevent vertical bone loss.[5,38] Others, however, have shown that this resource is used much less frequently, such as the study by Bassi et al.[40] who reported that the gap was filled with biomaterial in 33% of the cases. In these situations, the most important is the more palatal position of the implant and correct axial inclination.[8] In our study, the use of biomaterial in the surgical site and a temporary implant were significantly higher in the anterior group than in the posterior one. However, considering the success rate, no statistically significant difference was found in either groups regarding the use or not of biomaterial.

This result must be pointed out as it is known that single-tooth implants in posterior regions, especially molars, present occlusal, biomechanical and anatomical challenges such as: high occlusal loading, greater width of the alveoli, poor maxillary bone quality, and proximity with structures such as the maxillary sinus and mandibular canal.

The high success rate observed in the posterior maxillary and mandibular and anterior maxillary regions in our study reinforce the trend of success of rehabilitation using immediate implants. However, its important emphasize that our success criteria were based on the International Congress of Oral Implant Dentistry,[30] in Pisa, 2008, that considers implant failure if the following conditions are present: pain, mobility, bone loss greater than half its length, continuous exudate, or if implant has already been removed. If not, the implant placement was considered successful. This fact can be sometimes confounding when comparing the results with other researches. Kolerman et al.[43] showed 92% of success rate after anterior immediate implant placement,

but did not considered bone loss as a crucial aspect for failure characterization. On the contrary, a research from Cosny et al.[44] considered all characteristics around soft and hard peri-implant tissues, after healing, as a real parameter for success classification. This variation of the aspects concerning the true success rates, after implant placement, can become difficult the comparison among works, but do not invalidate the research *per si*, since that the parameters for success are well-described, as shown in our work. Therefore, despite this limitation, we consider that the results showing a high success rate in the anterior and posterior regions, reinforcing that rehabilitation with immediate implants is a highly predictable procedure, irrespective of the region.

## CONCLUSION

The anterior and posterior regions present a high short-term success rate when the immediate implant technique was used.

## REFERENCES

1. Adell R, Lekolm U, Rocler B, Brånemark PI. A 15 years study of implants in the treatment of the edentulous jaw. Int J Oral Surg. 1981; 10(6):387-416. doi:10.1016/S0300-9785(81)80077-4.

2. Albrektsson T, Brånemark PI, Hansson HA, Lindström J. Osseointegrated titanium implants Requirements for ensuring a long-lasting, direct bone-to-implant anchorage in man. Acta Odont Scand.1981; 52(2):155-170. doi:10.3109/17453678108991776.

3. Brãnemark PI. Osseointegration and its experimental background. J Prost Dent.1983; 50(3):399-409. doi: 10.1016/S0022-3913(83)80101-2.

4. Albrektsson TA. A multicenter study of osseointegrated oral implants. J Prosthet Dent .1983;60:75-84. doi: 10.1016/0022-3913(88)90355-1.

5.Ortega-Martinez J, Pérez-Pascual T, Mareque-Bueno S, Hermandez-Alfaro F, Ferres-Padro E. Immediate implants following tooth extraction. A systematic review. Med Patol Oral Cir Bucal 2012;17(2):251-261. doi: 10.4317/medoral.17469.

6. Mavrogenis AF, Dimitriou R, Parvizi J. Biology of implant osseointegration. J Musculoskelet Neuronal Interact. 2009;9(2):61-71.

7. Avila G, Galindo P, Rios H. Immediate implant loading: current status from available literature. Implant Dent. 2007; 16(3):235-245. doi: 10.1097/ID.0b013e3180de4ec5.

8. Weigl P, Strangio A. Immediately placed and restored single-tooth implants in the anterior maxilla. Eur J Oral Implantol 2016; Supl.1:89–106. doi: 10.1016/j.adaj.2017.05.008.

9.Schropp L, Kostopoulos L, Wenzel A. Bone healing following immediate versus delayed placement of titanium implants into extraction sockets: a prospective clinical study. Int J Oral Maxil Impl 2003;18:189-199. doi: 10.1016/S0022-3913(03)00476-1.

10. Del Fabbro M, Ceresoli V, Taschieri S, Ceci C, Testori T. Immediate loading of postextraction implants in the esthetic area: systematic review. Clin Impl Dent Rel Res. 2015; 17(1):52-69. doi: 10.1111/cid.12074. Epub 2013 Apr 22.

11. Chen ST, Wilson TG Jr, Hämmerle CH. Immediate or early placement of implants following tooth extraction: review of biologic basis, Clinical Procedures, and Outcomes. Int. J. Oral Maxil. Implants 2004;19:12–25.

12. Esposito M, Grusovin MG, Polyzos IP, Felice P, Worthington HV. Interventions for replacing missing teeth: dental implants in fresh extraction sockets (immediate, immediate-delayed and delayed implants). Chochrane Database Syst Rev. 2010; 8(9):CD005968. doi: 10.1002/14651858.CD005968.pub3.

13. Esposito M, Grusovin MG, Polyzos IP, Felice P, Worthington HV. Timing of implant placement after tooth extraction: immediate, immediate-delayed or delayed implants? A Cochrane systematic review. Eur J Oral Impl. 2010; 3(3):189-205.

14. Buser D, Chappuis V, Belser UC, Chen S . Implant placement post extraction in esthetic single tooth sites: when immediate, when early, when late? Periodontol 2000 2017; 73: 84-102. doi: 10.1111/prd.12170.

15. Peñarrocha M, Uribe R, Balaguer J. Immediate implants after extraction. A review of the current situation. Med Oral. 2004;9(3):234-242.

16. Cristalli MP, Marini R, La Monaca G, Sepe C, Tonoli F, Annibali S. Immediate loading of post-extractive single-tooth implants: a 1-year prospective study. Clin Oral Impl Res. 2015;26(9):1070-1079. doi: 10.1111/clr.12403. Epub 2014 Apr 16.

17. Goodacre C, Naylor WP. Single implant and crown versus fixed partial denture: a cost-benefit, patient-centred analysis**.** Eur J Oral Impl. 2016;9(supl.1):59-67.

18. Da Silva BC, De Carvalho PS, Vedovato E. Estudo retrospectivo da taxa de sobrevivência de implantes instalados por profissionais com diferentes graus de experiência na implantodontia. *RFO* 2015;20(3):295-301. doi: 10.5335/rfo.v20i3.4611.

19. Patil SS, Balkunde AS, Samanti A, Patil R, Kadam P. Complications of immediate implant placement and its management; a review article. Int J Cur Med App Sci. 2015; 8(3):78-80.

20. Botticelli D, Persson LG, Lindhe J, Berglundh T. Bone tissue formation adjacent to implants placed in fresh extraction sockets: an experimental study in dogs. Clin Oral Impl Res. 2006; 17:351–358. doi: 10.1111/j.1600-0501.2006.01270.x.

21. Esposito M, Hirsch JM, Lekholm U, Thomsen P. Biological factors contributing to failures of osseointegrated oral implants. (I) Success criteria and epidemiology. Eur J Oral Sci .1998; 106:527–551. doi: 10.1046/j.0909-8836..t01-2-.x.

22. Chrcanovic BR, Albrektsson T, Wennerberg A. Dental

implants inserted in fresh extraction sockets versus healed sites: A systematic review and meta-analysis. J Dent 2015; 43(1):16-41. doi: 10.1016/j.jdent.2014.11.007.

23. Nkenke E, Schliephake H. Immediate loading and immediate restoration of oral implants: indications and survival rates. J Dent implantol 2009; 25(2).

24. Lioubavina-Hack N, Lang NP, Karring T. Significance of primary stability for osseointegration of dental implants. Clin Oral Impl Res. 2006;17:244–250. doi: 10.1111/j.1600-0501.2005.01201.x.

25. Tolstunov L. Implant zones of the jaws: implant location and related sucess rate. J Oral Imp. 2007;33(4):211-220.

26. Jemt T, Karouni M, Abitbol J, Zouiten O, Antoun H. A retrospective study on 1592 consecutively performed operations in one private referral clinic. Part II: Peri-implantitis and implant failures. Clin Implant Dent Relat Res. 2017;19(3):413-422. doi: 10.1111/cid.12481

27. Simsek B, Simsek S. Evaluation of success rates of immediate and delayed implants after tooth extraction. Chin Med J. 2003;116(8):1216-1219.

28. Bilhan H, Mumcu E, Geçkili O, Atalay B. The Evaluation of the success of immediately placed single implants: A retrospective clinical study. Impl Dent. 2011;20(3):215-225. doi: 10.1097/ID.0b013e3182181ee6.

29. Moy PK, Nishimura GH, Pozzi A, Danda AK. Single implants in dorsal areas – A systematic review**.** Eur J Oral Impl 2016; 9(supl.1):163-172.

30. Misch CE, Perel ML, Wang HL, Sammartino G, Galindo-Moreno P, Trisi P, at al. Implant success, survival, and failure: The International Congress of Oral Implantologists (ICOI) Pisa Consensus Conference**.** Impl Dent. 2008; 17(1):5-15. doi: 10.1097/ID.0b013e3181676059.

31. Albrektson T, Wennerberg A. The impact of oral implants- past and future,1962-2042. J Can Dental Assoc. 2005;71(5):327-327d.

32. Tarazona B, Tarazona-Alvarez P, Penarrocha-Oltra D, Penarrocha-Diago M. Relationship between indication for tooth extraction and outcome of immediate implants: a retrospective study with 5 years. J Clin Exp Dent. 2014**;** 6(4):384-388. doi: 10.4317/jced.51616. eCollection 2014 Oct.

33. Chang PC, Lang NP, Giannobile WV. Evaluation of functional dynamics during osseointegration and regeneration associated with oral implants. Clin Oral Impl. Res. 2010;.21:1-12. doi: 10.1111/j.1600-0501.2009.01826.x.

34. Arlin ML. Immediate placement of osseointegrated dental implants into extraction sockets: advantages and case reports**.** Oral Health, 1992:.19-26.

35. Lang NP, Pun L, Lau KY, Li KY, Wong MC. A systematic review on survival and success rates of implants placed immediately into fresh sockets after at least 1 year. Clin Oral Impl Res**.** 2012; 23(supl.5):39-66. doi: 10.1111/j.1600-0501.2011.02372.x.

36. Braut V, Bornstein MM, Belser U, Buser D. Thickness of the anterior maxillary facial bone wall: a retrospective radiographic study using cone beam computed tomography. Int J Periodontics Restorative Dent. 2011**;** 31:125-131.

37. Cooper LF, De Kok IJ, Rojas-Vizcaya F, Pungpapong P, Chang SH. The immediate loading of dental implants. Comp Con Educ Dent. 2007; 28(4):216-225.

38. Garcia J, Sanguino D. A new protocol for immediate implants. The rule of 5 triangles. European Academy of Osseointegration – Clin Oral Impl Res. 2014; 4-5.

39. De Rouck T, Collys K, Cosyn J. Single-toth replacement in the anterior maxilla by means of immediate implantation and provisionalization: a review. Int J Oral Maxillofac Impl. 2008; 23(5):897-904.

40. Bassi AP, Ponzoni D, Carvalho P, Carrera ET. Estudo retrospectivo de implantes osseointegrados instalados imediatamente após exodontias. INPN 2014**;**11(2):233-236.

41. Vidal F, Rescala B, Rosalém Jr. W. Oclusão e protocolos de aplicação de cargas funcionais em implantes unitários posteriores. Implant News. 2013**;**10(1):41-48.

42. Ketabi M, Deporter D, Atenafu EG. A systematic review of outcomes following immediate molar implant placement based on recently published studies. *Clin Impl Dent Rel Res* 2016;18(6):1084-1094. doi: 10.1111/cid.12390. Epub 2016 Feb 8.

43. Kolerman R, Mijiritsky E, Barnea E, Dabaja A, Nissan J, Tal H. Esthetic assessment of implants placed into fresh extraction sockets for single-tooth replacements using a flapless approach. *Clin Implant Dent Relat Res*. 2017;19(2):351-364. doi: 10.1111/cid.12458.

44. Cosyn J, Eghbali A, De Bruyn H, Collys K, Cleymaet R, De Rouck T. Immediate single- tooth implants in the anterior maxilla: 3-year results of a case series on hard and soft tissue response and aesthetics. *J Clin Periodontol* 2011; 38: 746–753. doi: 10.1111/j.1600-051X.2011.01748.x.

# IS MOUTH-BREATHING RELATED TO ALTERATIONS IN FACIAL SOFT TISSUES?

Luciana Campos **Guimarães**[1], Lílian Vieira **Lima**[2], Julia Garcia **Costa**[1], Adriana de Alcantara Cury **Saramago**[1], Cláudia Trindade **Mattos**[1], Beatriz de Souza **Vilella**[1], Oswaldo de Vasconcellos **Vilella**[1*]

[1]Department of Orthodontics, School of Dentistry, Federal University Fluminense, Niterói, Brazil.
[2]Specialist in Radiology; Private practice in Rio de Janeiro, RJ, Brazil.

**Palavras-chave**: Respiração Bucal. Obstrução Nasal. Tegumento Comum. Cefalometria. Tomografia Computadorizada de Feixe Cônico.

**RESUMO**

**Objetivo:** Comparar os tecidos moles faciais de respiradores nasais (RN) e bucais (RB), utilizando imagens de tomografia computadorizada de feixe cônico (TCFC). **Métodos:** Foi realizado um estudo comparativo composto por quatro variáveis cefalométricas angulares e oito lineares, obtidas de tecidos moles faciais de indivíduos RN e RB, em uma amostra composta por 43 indivíduos jovens de ambos os sexos, com idades entre 11 e 24 anos, submetidos ao exame tomográfico anteriormente ao tratamento ortodôntico. Os indivíduos foram previamente divididos em dois grupos por um otorrinolaringologista, de acordo com o padrão respiratório. O diagnóstico da respiração bucal foi feito em conformidade com os resultados de exames específicos: exame clínico, rinoscopia e endoscopia nasal. Os dados obtidos a partir do software InVivo 5.3 Dental (Anatomage - San Jose, Califórnia) foram avaliados através da comparação dos valores das medições das variáveis dos grupos RN e RB, além da comparação das diferenças entre esses valores. **Resultados:** Houve diferenças estatisticamente significativas entre os grupos com relação às variáveis, "ângulo nasolabial", "inclinação do incisivo central superior" e "convexidade dos tegumentos faciais". **Conclusão:** Os respiradores bucais adolescentes e adultos jovens apresentam ângulo nasolabial mais aberto, devido à maior inclinação lingual do longo eixo dos incisivos superiores, além de maior convexidade dos tecidos moles faciais.

**Keywords**: Mouth Breathing. Nasal Obstruction. Integumentary System. Cephalometry. Cone-beam Computed Tomography.

**ABSTRACT**

**Objective:** To compare the facial soft tissues of nasal breathers (NB) and mouth breathers (MB) using cone-beam computed tomography (CBCT).

**Methods:** This was a comparative study of four angular and eight linear cephalometric variables obtained from the facial soft tissues of 43 young men and women aged between 11 and 24 years. Subjects had tomographic examination prior to the orthodontic treatment and were previously divided into two groups by an otolaryngologist according to the respiratory pattern of nasal or mouth breathing. The selection was made in accordance with the results of: clinical examination, rhinoscopy, and nasal endoscopy. The data obtained from the software InVivo Dental 5.3 (Anatomage - San Jose, California) was evaluated by comparing values measured between MB and NB groups. **Results:** There were significant differences between groups for variables, "nasolabial angle", inclination of upper central incisor" and "convexity of the facial soft tissues". **Conclusion:** Adolescent and young adult mouth breathers present an open nasolabial angle due to the retroinclination of their upper incisors. In addition to greater convexity of the facial soft tissues.

Submitted: June 13, 2019
Modification: November 6, 2019
Accepted: November 14, 2019

***Correspondence to:**
Oswaldo de Vasconcellos Vilella
Address: Universidade Federal Fluminense. Rua Mário Santos Braga, 30, 2º andar – sala 214, Centro, Campus do Valonguinho, Niterói (RJ), Brazil.
Zip code: 24020-140
Telephone number: +55 (21) 2629-9812
E-mail: ovvilella@gmail.com

## INTRODUCTION

Respiratory function and its influence on the development of the orofacial structures have been thoroughly studied.[1-4] Moss[5] observed that nasal breathing promotes harmonious growth and development of the maxilocraniofacial complex. It interacts with other physiological functions such as chewing and swallowing in addition to setting tongue and lips in a normal position.[3] In contrast, mouth breathing does not provide normal conditions for the development of the nasomaxillary complex. It provokes the lowering of the jaw, leading to extrusion of the posterior teeth and alveolar process remodeling. The increase in vertical proportions was observed in both humans and animals, significantly changing the morphology of the face.[4]

Another consequence of mouth breathing is the flexion of the head in relation to the cervical spine, which allows the jaw to remain in its correct position while the skull is flexed back. The flexion of the head causes stretching of the integuments which, in turn, acts as a restrictive force to facial development.[4,6]

This restriction to the facial development of mouth breathers probably results in alterations of the integuments as well. Souki et al[7] noted differences in the facial soft tissues of children who breathe through the mouth compared to those who breathe predominantly through the nose. However, it is unknown if these findings extend to older age groups.

Therefore, the purpose of this study was to compare the facial soft tissues of adolescent and young adults who breathe through the nose or the mouth to confirm the hypothesis that there are differences, using CBCT images.

## MATERIALS AND METHODS

This comparative observational cross-sectional retrospective study was approved by the local ethics committee by the number 2.108.748. The material was composed of cone beam CT scans obtained prior to orthodontic treatment of patients belonging to the orthodontic clinic of the Universidade Federal Fluminense. These individuals were previously evaluated by an otolaryngologist. They were divided into two groups based on their respiratory pattern: mouth breathers (MB) or nasal breathers (NB), according to the results of their clinical exam (direct view), rhinoscopy, and nasal endoscopy. As this was a retrospective study, no exams were conducted specifically for the research.

Sample size calculation was performed using the formula described by Pandis[8] to determine the number of individuals required for each research group. Using an assumed power level of 80%, $\alpha$ of 0.05, and the standard deviation described in the article by Souki et al,[7] at least 16 subjects would be needed in each group.

The MB group was composed of 27 CT scans (mean age 14 years and 7 months), and the NB group was composed of 16 CT scans (mean age 15 years and 6 months).

The inclusion criteria for CT scans and patients were: 1. tomographic images from individuals between 11 and 24 years of age from both sexes; 2. in the permanent dentition stage; 3. no suggestive image of sinusitis; 4. without recent head and neck surgery (up to six months before the evaluation); 5. without inflammation or infection of the airways.

The exclusion criteria were: 1. orthodontic treatment; 2. sucking habits (finger and pacifier); 3. upper airway disorders perceived in the image exams; 4. syndromes; 5. neurological problems; 6. craniofacial anomalies.

Cone-beam computed tomography (CBCT) was performed using a 3D i-CAT scanner (Imaging Sciences International Inc., Hatfield, USA) and processed using native software (Xoran Technologies, Ann Arbor, Michigan) to create a DICOM file.

Participants were instructed to remain with a natural head posture by looking at a fixed point during the examination and to maintain maximum intercuspation. The CBCT was obtained in the complete FULL 220-mm mode, where the scanner performs two rotations (20+20 seconds; 0.4 voxel), allowing to scan the entire skull.

The images of the tomographic exams were stored in Digital Imaging and Communications in Medicine (DICOM) file format and imported into the InVivo Dental 5.3 software (Anatomage, San Jose, California).

The Super Ceph tool created images in the sagittal view like those of cephalometric radiographs. These images were evaluated by two examiners (one specialist in orthodontics and one dental radiology specialist). The objective was to reproduce an image similar to the lateral cephalometric radiograph. A 21.5" LCD widescreen monitor with 1920 × 1080-pixel resolution was used in the evaluation. The angular and linear measurements were carried out at random and blinded to the identity of the subjects. The measured variables are described in Table 1. Examples of three measurements are showed in Figure 1 (A, B and C).

***Table1:*** *Description of the cephalometric variables.*

| Variables | Definition |
|---|---|
| GSn.Pog' (convexity of the facial soft tissues) | Angle formed by the plans glabella (G) – subnasal (Sn) and subnasal (Sn) – integumentary pogonion (Pog') |
| ColSn.UL (nasolabial angle) | Angle formed between the plan that touches the base of the nose, passing through the subnasal (Sn) and columela (Col) points, and the plan that touches the outermost point of the upper lip (UL) |
| ColUL-Np (nasal prominence) | Distance between the columela (Col) – upper lip (UL) plan and the most prominent point of integumentary nose profile (Np) |
| UL-SnPog' (upper lip protrusion) | Distance between the plane formed by the subnasal point (Sn) and integumentary pogonion (Pog') with the upper lip |
| LL-SnPog' (lower lip protrusion) | Distance between the plane formed by the subnasal point (Sn) and integumentary pogonion (Pog') with the lower lip |
| UI-Vertical border 1(upper lip thickness) | Distance between the most prominent point of the contour of the upper central incisor (UI) and the vertical border 1 (perpendicular to the Frankfurt horizontal plane passing through the outermost point of the upper lip) |
| LI-Vertical border 2 (lower lip thickness) | Distance between the most prominent point of the contour of the lower central incisor (LI) and the vertical border 2 (perpendicular to the Frankfurt horizontal plane passing through the outermost point of the lower lip) |
| $STO^{u}$-Sn (upper lip length) | Distance between the innermost point of the contour of the upper lip (upper stomium; $STO^{u}$) and the subnasal point (Sn) |
| $STO^{l}$-Me' (lower lip length) | Distance between the innermost point of the contour of the upper lip (lower stomium $STO^{l}$) and the lowest point of the mandibular symphysis in soft tissue (Me') |
| Pog-Pog' (chin thickness) | Distance between the most anterior point of the outline of the chin in the sagittal plane (Pog) and its equivalent in soft tissue (Pog') |
| GoGN.SN (mandibular plane angle) | Determined by the intersection of the mandibular plane (Go-Gn) with the line SN |
| Inclination of the $\underline{1}$ | Angle formed between the long axis of the upper central incisor and the palatal plane |

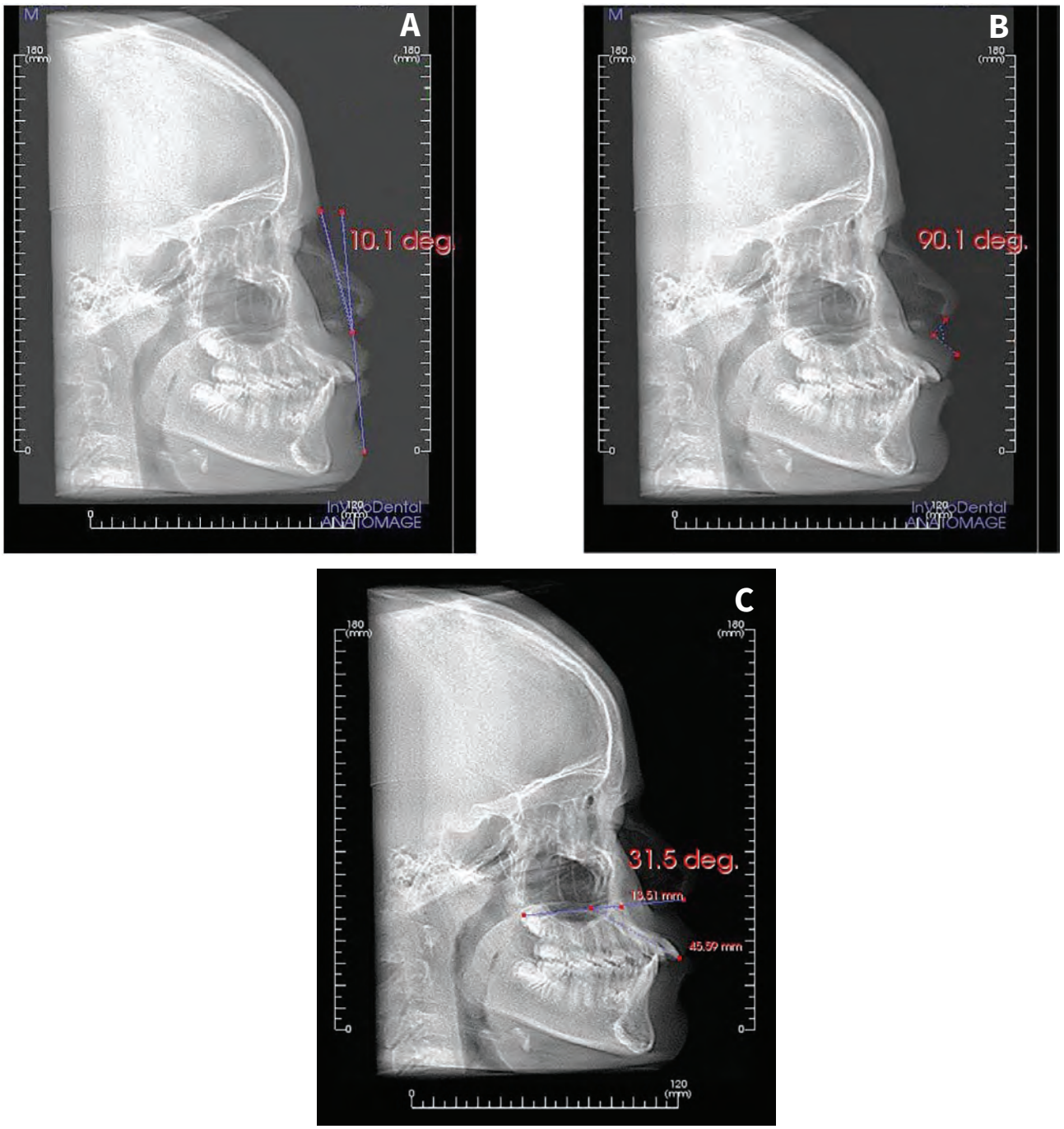


***Figure 1**: Measurement of the variables using the software InVivo Dental 5.3. A: Convexity of the facial soft tissues (degrees); B: Nasolabial angle (degrees); C: Upper incisor inclination (degrees).*

All statistical analysis was performed using SPSS for Windows (version 20.0, IBM, Armonk, NY). The level of 5% of probability was adopted as a statistically significant difference.

## RESULTS

The Angle Class II malocclusion affected 40.7 % of the mouth breathers and 12.5 % of the nose breathers.

Table 2 shows the ICC and the paired *t*-test results. For both inter- and intra-examiner, the reproducibility of eight variables were considered excellent (ICC ≥ 0.75), while

## Statistical Analysis

All measurements were repeated by both examiners within a 30-day interval. The intraclass correlation coefficient (ICC) and paired *t* test were used to evaluate inter- and intra-examiner error of the method.

The normality of the data distribution was checked using the Kolmogorov–Smirnoff test. The independent samples *t*-test was used to perform the inter-groups comparison.

four were considered satisfactory ($0.5 \leq ICC < 0.75$)[9]. The variable of "lower lip thickness" presented a statistically significant difference in inter- and intra-examiner comparisons ($p = 0.039$ and $p = 0.018$, respectively). The variable of "upper lip length" showed statistically significant difference in the intra-examiner comparison ($p = 0.001$). These values obtained were therefore considered unreliable and were dropped from the research.

Table 3 presents the means, standard deviations, and range of values for each variable in the MB and NB groups. According to the results of the independent samples *t* test, significant differences were observed for the variables "convexity of the facial soft tissues" ($p = 0.017$), "nasolabial angle" ($p = 0.034$), and "inclination of the 1" ($p = 0.010$). In other words, mouth breathers present greater convexity of the facial soft tissues with higher values for the nasolabial angle and their upper incisors are more retroinclined.

***Table 2:*** *Intraclass correlation coefficient (ICC) and paired t test with the significance level for each variable for the intra and inter-examiner comparison.*

| Variable | ICC | | *t* test | | | |
|---|---|---|---|---|---|---|
| | Intra-examiner | Inter-examiner | Intra-examiner | | Inter-examiner | |
| | | | Difference | p | Difference | p |
| Convexity of the facial soft tissues (°) | 0.938 | 0.882 | 1.69 | 0.519 | 0.06 | 0.896 |
| Nasolabial angle (°) | 0.630 | 0.688 | 1.03 | 0.602 | 0.48 | 0.791 |
| Nasal prominence(mm) | 0.667 | 0.666 | 0.22 | 0.411 | 0.34 | 0.255 |
| Upper lip protrusion (mm) | 0.869 | 0.836 | 0.08 | 0.698 | 0.23 | 0.339 |
| Lower lip protrusion (mm) | 0.911 | 0.926 | 0.13 | 0.459 | 0.03 | 0.835 |
| Upper lip thickness(mm) | 0.682 | 0.752 | 0.21 | 0.373 | 0.08 | 0.656 |
| Lower lip thickness (mm) | 0.807 | 0.651 | 0.42 | 0.039* | 0.59 | 0.018* |
| Upper lip length (mm) | 0.830 | 0.835 | 0.87 | 0.001* | 0.33 | 0.175 |
| Lower lip length (mm) | 0.495 | 0.862 | 1.16 | 0.180 | 0.13 | 0.721 |
| Chin thickness (mm) | 0.813 | 0.698 | 0.13 | 0.504 | 0.24 | 0.405 |
| Inclination of the 1 (°) | 0.871 | 0.802 | 0.07 | 0.664 | 0.05 | 0.912 |
| Mandibular plane angle (°) | 0.849 | 0.852 | 0.77 | 0.087 | 0.31 | 0.352 |

**Note**: * = p < 0.05

***Table 3:*** *Arithmetic means (Mean), standard deviations (SD), minimum and maximum values of the variables related to mouth and nasal breathers, and the independent t test significance level (p-value).*

| | Mouth breathers (n = 27) | | | | Nasal breathers (n = 16) | | | | Significance |
|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Minimum | Maximum | Mean | SD | Minimum | Maximum | (*p*-value) |
| Age | 14y07m | 03y00m | 11y00m | 22y06m | 15y06m | 03y04m | 11y02m | 24y05m | 0.327 |
| Convexity of the facial soft tissues (°) | 17.07 | 6.15 | 9.10 | 35.30 | 11.81 | 7.57 | -12.10 | 20.40 | 0.017* |
| Nasolabial angle (°) | 103.00 | 15.82 | 66.30 | 130.00 | 92.85 | 12.29 | 70.60 | 113.10 | 0.034* |
| Nasal prominence (mm) | 7.63 | 2.29 | 3.38 | 11.76 | 8.18 | 2.41 | 3.41 | 13.15 | 0.457 |
| Upper lip protrusion (mm) | 4.90 | 2.79 | 1.08 | 12.20 | 4.92 | 2.57 | 0.23 | 10.37 | 0.986 |
| Lower lip protrusion (mm) | 5.14 | 3.12 | 0.15 | 10.81 | 5.39 | 2.82 | 2.09 | 12.70 | 0.789 |
| Upper lip thickness (mm) | 9.42 | 1.78 | 6.42 | 12.50 | 9.63 | 2.10 | 6.43 | 14.08 | 0.736 |
| Lower lip length (mm) | 50.20 | 4.33 | 43.43 | 60.45 | 49.56 | 5.23 | 41.99 | 58.44 | 0.670 |
| Chin thickness (mm) | 12.03 | 2.39 | 8.30 | 18.14 | 12.45 | 1.94 | 9.73 | 16.69 | 0.551 |
| Inclination of the 1 (°) | 65.70 | 8.00 | 53.80 | 85.30 | 58.38 | 9.92 | 31.50 | 71.50 | 0.010* |
| Mandibular plane angle (°) | 34.83 | 5.99 | 23.50 | 45.00 | 32.53 | 4.43 | 24.50 | 38.50 | 0.190 |

**Note**: * = p < 0.05

## DISCUSSION

Several studies have been conducted to clarify the consequences of mouth-breathing on craniofacial growth.[3,10,11] However, very little work has been performed on the changes of the facial soft tissues of mouth breathers.

For many years, severe nasal obstruction was believed to cause "adenoid facies," characterized by a half-open mouth, raised upper lip, unexpressive physiognomy, and tendency to drool. Currently it is known that, this condition affects only a small portion of mouth breathers.[4]

Significant differences in the facial soft tissues were observed between nasal and mouth breathing children,[7] aged two to ten years (mean age six years and seven months). The present study aimed to verify which changes would be expected in teenagers and young adults, aged between 11 and 24 years.

The convexity of the facial soft tissues of mouth breathing teenagers and young adults was larger than NB. This result can be explained by the difference in the selection of the groups. In the MB group, the percentage of individuals who had dental Class II relationship (Angle) was 40.7%, compared to 12.5% in the NB group. In fact, a previous study found that the prevalence of Class II is higher among mouth breathers.[12] In contrast, Souki et al[7] found no significant difference in children, likely because the two groups selected by these authors presented an equal number of individuals with a tendency toward Class II.

The nasolabial angle of mouth breathers was significantly higher than NB. This finding is associated with the larger lingual inclination of upper incisors, which is significantly higher in mouth breathers. Various authors[4,13,14] reported that nasal obstruction and consequent mouth breathing, has the effect of retroinclination of these teeth, which produces a more obtuse nasolabial angle. In contrast, Souki et al[7] found opposite results, explaining this by a compensation of a more anterior position of the upper lip which would facilitate better air flow.

The other variables studied showed no significant differences between groups. However, it is interesting to note that the inclination of the mandibular plane angle was higher in the MB group (34.83º) than in the NB group (32.53º), consistent with previous literature.[4,13]

"Chin thickness" was higher in the NB group, although not statistically significant. On the other hand, the study by Souki et al[7] has shown a significant difference in chin thickness in children groups of mouth and nose breathers, which is likely explained by the difference in the number of Class I and II components between groups selected by those authors.

Other discrepancies were observed when the results of this survey were confronted with those recorded in the youngest group.[7] Mouth breathing children presented significant differences for "nasal prominence", "upper lip protrusion", "lower lip protrusion", and "lower lip length" compared with NB. One possible explanation is that the thickness and the length of the lips become larger over the years,[15] which proportionally decreases the difference in older age groups. In our research, despite a non-statistical significance, the values for these variables tended to be higher in the NB group.

Perhaps the aesthetic perception of the adolescent/young adult about their facial profile can lead to unconscious lip closure. This habit could likely change the profile characteristics.

A limitation of the research was the non-inclusion of the skeletal pattern as one of the sample selection criteria. Therefore, the realization of further studies on this subject is highly recommended.

## CONCLUSION

Adolescent and young adult mouth breathers present greater convexity of the facial soft tissues. They also have an open nasolabial angle due to the retroinclination of the upper incisors, but there are still many unanswered questions regarding facial integuments of mouth breathers.

## REFERENCES

1. Nascimento RR, Masterson D, Mattos CT, Vilella OV. Facial growth direction after surgical intervention to relieve mouth breathing: systematic review and meta-analysis. J Orofac Orthop 2018; 79:412–426.

2.Fraga WS, Seixas VM, Santos JC, Paranhos LR, César CP. Mouth breathing in children and its impact in dental malocclusion: a systematic review of observational studies. Minerva Stomatol 2018; 67:129-138.

3. Faria PT, de Oliveira Ruellas AC, Matsumoto MA, Anselmo-Lima WT, Pereira FC. Dentofacial morphology of mouth breathing children. Braz Dent J 2002; 13:129-132.

4. Linder-Aronson S. Adenoids. Their effect on mode of breathing and nasal airflow and their relationship to characteristics of the facial skeleton and the dentition. A biometric, rhino-manometric and cephalometro-radiographic study on children with and without adenoids. Acta Otolaryngol Suppl 1970; 265:1- 132.

5. Moss ML, Salentijn L. The primary role of functional matrices in facial growth. Am J Orthod 1969; 55:566-577.

6. Solow B, Kreiborg S. Soft-tissue stretching: a possible control factor in craniofacial morphogenesis. Scand J Dent Res 1977; 85:505-507.

7. Souki BQ, Lopes PB, Veloso NC, Avelino RA, Pereira TB, Souza PE et al. Facial soft tissues of mouth-breathing children: do expectations meet reality? Int J Pediatr Otorhinolaryngol 2014; 78:1074-1079.

8. Pandis N. Sample calculations for comparison of 2 means. Am J Orthod Dentofacial Orthop 2012; 141:519-521.
9. Walter SD, Eliasziw M, Donner A. Sample size and optimal designs for reliability studies. Stat Med 1998; 17:101-110.
10. Giuca MR, Pasini M, Galli V, Casani AP, Marchetti E, Marzo G. Correlations between transversal discrepancies of the upper maxilla and oral breathing. Eur J Paediatr Dent 2009; 10:23-28.
11. Frasson JM, Magnani MB, Nouer DF, de Siqueira VC, Lunardi N. Comparative cephalometric study between nasal and predominantly mouth breathers. Braz J Otorhinolaryngol 2006; 72:72-81.
12. Souki BQ, Pimenta GB, Souki MQ, Franco LP, Becker HM, Pinto JA. Prevalence of malocclusion among mouth breathing children: do expectations meet reality? Int J Pediatr Otorhinolaryngol 2009; 73:767-773.
13. Solow B, Siersbaek-Nielsen S, Greve E. Airway adequacy, head posture, and craniofacial morphology. Am J Orthod 1984; 86:214-223.
14. Quinn GW. Airway interference syndrome. Clinical identification and evaluation of nose breathing capabilities. Angle Orthod 1983; 53:311-319.
15. Nanda RS, Meng H, Kapila S, Goorhuis J. Growth changes in the soft tissue facial profile. Angle Orthod 1990; 60:177-190.

# ASSOCIATION OF PARENTING STYLE WITH THE BEHAVIOUR AND CARIES PREVALENCE OF PRESCHOOL CHILDREN

Beatriz Fernandes **Arrepia**[1], Jéssica Aparecida **da Silva**[1,2], Paula Maciel **Pires**[1], Maysa Lannes **Duarte**[1,3], Laura Guimarães **Primo**[1], Andréa **Fonseca-Gonçalves**[1*]

[1]Department of Paediatric Dentistry and Orthodontics, Universidade Federal do Rio de Janeiro, Rio de Janeiro, RJ, Brazil.
[2]Department of Paediatric Dentistry and Orthodontics, Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil.
[3]School of Dentistry, Health Institute of Nova Friburgo, Universidade Federal Fluminense, Nova Friburgo, RJ, Brazil.

**Palavras-chave:** Estilos parentais, cárie dentária, comportamento, pré-escolares

**RESUMO**

**Objetivo:** Objetivou-se associar os estilos parentais (democrático, autoritário e permissivo) com o comportamento e a prevalência de lesões de cárie de pré-escolares submetidos ao atendimento odontológico. **Métodos:** Em consulta inicial, pré-escolares (n = 67), de 2 a 6 anos de idade, foram avaliados quanto ao comportamento, através da escala de Frankl. Os estilos parentais de seus responsáveis foram averiguados através do Questionário de Estilos e Dimensões Parentais – Versão Reduzida (PSDQ) e a prevalência de lesões de cárie através do índice ceod. Foram coletados dados sociodemográficos e econômicos. Utilizou-se o teste do Qui-quadrado para associação entre os estilos parentais, o índice ceod, tipo de comportamento (dicotomizado em positivo e negativo) e as variáveis independentes: nível socioeconômico, ser filho único, frequentar escola e nível educacional do responsável. ANOVA seguido de Tukey foi utilizado para comparar as médias ceod e os estilos parentais. **Resultados:** A maioria dos pré-escolares apresentaram comportamento positivo (83,6%) e a média do ceo-d da população estudada foi 4,76 (± 3,43). Do total dos responsáveis, 49,3% eram democráticos, 44,8% permissivos e 6% autoritários. Não houve associação entre os estilos parentais e todas as variáveis investigadas (p > 0,05). **Conclusão:** Diante dos resultados, pode-se observar que não houve associação entre os estilos parentais avaliados, prevalência de cárie e comportamento dos pré-escolares em consulta odontológica inicial.

**Keywords:** parenting styles, dental caries, behaviour, preschoolers

**ABSTRACT**

**Objective:** This study aimed to associate parenting styles (democratic, authoritarian, and permissive) with the behaviour, and prevalence of caries lesions among preschool children submitted to dental care. **Methods:** At the initial consultation, preschool children (n = 67), from two to six years of age, were evaluated for behaviour through the Frankl scale. The parenting styles were investigated through the Parenting Styles and Dimensions Questionnaire - Reduced Version (PSDQ) and the prevalence of caries lesions through the dmft index. Sociodemographic and economic data were collected. The chi-squared test was used for association among parenting styles, dmft index, type of behaviour (dichotomised as positive and negative), and the following independent variables: socioeconomic level, single child, school attendance, and educational level of the person in charge. ANOVA followed by the Tukey test were used to compare the mean dmft and parenting styles. **Results:** The majority of preschoolers presented positive behaviour (83.6%), and the dmft mean was 4.76 (± 3.43). Of the total, 49.3% were democratic, 44.8% were permissive, and 6% were authoritarian. There was no association between parenting styles and all variables investigated (p > 0.05). **Conclusion:** Considering the results, it can be observed that there was no association among parenting styles, caries prevalence, and behaviour of the preschool children in an initial dental consultation.

Submitted: January 12, 2020
Modification: January 9, 2020
Accepted: January 9, 2020

***Correspondence to:**
Andréa Fonseca-Gonçalves
Address: Rua Rodolpho Paulo Rocco, 325 – Cidade Universitária
Ilha do Fundão, Rio de Janeiro, RJ, Brazil.
Zip code: 21941-913
Telephone number: (55) 21 3938-2098
E-mail: andrea.goncalves@odonto.ufrj.br

# INTRODUCTION

The behaviour of a child may hinder effective dental treatment. This is one of the greatest challenges faced by paediatric dentists,[1,2] since it is known that behaviour can be influenced by health, culture, age, cognitive level, anxiety and fear, reaction to strangers, social expectations, and temperaments.[3] Parenting styles were defined by Baumrind (1966, 1971)[4,5] as a set of attitudes and practices related to the issues of power, hierarchy, emotional support, and encouragement for autonomy that parents experience with their children and that reflect the values considered important to be transmitted to the child through his or her educational practices. Thus, parents play an important role in the development of their child's current and future emotional health, personality, character, well-being, social and cognitive development, and academic development.[6,7]

Considering that parents play a fundamental role in the way a child behaves in dental practice, especially when they have had negative experiences, an evaluation of the parenting styles by the paediatric dentist becomes important to realise which educational practices are performed by these parents,[1,8] since an anxious or fearful parent may negatively affect the child's behaviour in the dental office.[9,10]

The Parenting Styles and Dimensions Questionnaire - Short Form (PSDQ),[11] validated for the Portuguese language,[12,13] evaluates three parenting styles: authoritarian, democratic, and permissive. The authoritarian style is characterised by high control and little affection, the democratic style by high control and a lot of affection, and the permissive style by low control and very much affection.[12,13,14]

Regarding child behaviour, several strategies have been proposed to evaluate the emotional state and classify it in the dental environment, such as the behaviour assessment using the Frankl behaviour evaluation scale,[15] considered the gold standard. This scale divides the behaviours observed during the appointment into four categories: definitely negative (- -), when the child refuses to accept treatment; negative (-), when referring to the patient with resistance to accept the treatment; positive (+) for patients who accept the treatment; and the definitive positive (+ +) for patients with total affinity with the dental surgeon.[15]

Sugar consumption is increasing among children, which is a concern for the general and oral health of these individuals,[16,17,18] and in Brazil, dental caries, a biofilm sugar-dependent disease, are one of the most important public health problems, where a mean of decayed, lost, and restored teeth was observed in the last national epidemiological survey (dmft index) of 2.3[19] in children at five years of age; therefore, it is suggested that there is an association among parenting styles, the prevalence of caries lesions, and the behaviour of preschool children in the dental environment, as well as the behaviour of the children.[16,17,20] Thus, the objective of the present study was to investigate a possible association among parenting styles, behaviour, and the prevalence of caries lesions among preschool children submitted to dental care at the Baby Clinic of the School of Dentistry of the Federal University of Rio de Janeiro (UFRJ).

# MATERIALS AND METHODS

## Study design and sample participation

The present cross-sectional observational study evaluated the following variables: the behaviour of preschoolers from two to six years of age, using the Frankl behaviour evaluation scale,[15] the parenting styles of their parents, before applying the PSDQ,[12] and the prevalence of caries lesions through examination of decayed, missing, and filled teeth (dmft index)[21] of these children, attended at the Baby Clinic of the Dental School of UFRJ. Participants were selected for convenience after a thorough anamnesis and clinical exams by trained and calibrated examiners for the purpose of observing their dental condition and medical and dental history. Thus, preschool children (n = 74) with good general health who sought care between April 2017 and November 2018 at the Baby Clinic of the Dental School of UFRJ were included in the study. Children with systemic alterations, syndromes, cleft lip and palate, or any other developmental anomaly were excluded. Children accompanied by someone other than their parents/guardians or whose parents/guardians had special needs (psychological, psychiatric, or neurological changes) that could make their responses unfeasible through the PSDQ were also excluded.

This study was approved by the Ethics Committee of UFRJ - University Hospital Clementino Fraga Filho (protocol no. 2.425.896/2017). Those responsible for the children were informed about the research and agreed to participate.

## Training and calibration exercise

The calibration exercise was carried out through two steps (theoretical and clinical). The theoretical step consisted of a discussion of the criteria for behavior classification (Frankl behaviour evaluation scale) and the diagnosis of dental caries (dmft index)[19] among two professors of pediatric dentistry and two specialist examiners. The clinical step was performed with 10 children between two and six years of age, who were not part of the main sample, in order to register their behaviour and dmft index during the appointment.

For behaviour, each dentist (the specialists) examined

the selected 10 children and wrote down their behaviour after the consultation, independently. Thus, the inter-rater agreement (Kappa = 0.766) was ascertained for the Frankl scale. For caries lesions, the 10 non-participants of the final sample were submitted to evaluation through the dmft index in a dental office by two examiners independently, where inter-rater agreement (Kappa= 0.943) was reached.

The Portuguese version of the PSDQ that used to be based on the European portuguese,[12] was the instrument used in the present research. However, with the most recently version based and also validated to be used in Brazil,[13] 10 other children were submitted to comparison evaluation by average of the parenting styles resulting from both questionnaires (in European Portuguese and in Portuguese from Brazil), and the similarity between them was checked.

A test–retest of the instrument of evaluation of the parenting style with the same parents of the 10 children was also carried out, following an interval of seven days between the applications, to verify the stability of the instrument used. Thus, adequate stability of the PSDQ was observed using the intraclass correlation coefficient (ICC = 0.858).

## Data collection and instrument use

The general data were collected through anamnesis with those responsible for the preschool children. Thus, sociodemographic information, such as gender, age, educational level of the head of the family, birth order, whether enrolled in school/nursery, and birth order, were obtained. Data on the socioeconomic level of the family were also collected.[22]

In order to record the behaviour of the preschoolers, the two examiners, previously trained and calibrated, were responsible for observing the reactions of each patient from the beginning to the end of a clinical examination visit with prophylaxis, performed by multiple operators, students of the specialisation courses and master's degree in Paediatric Dentistry of UFRJ, who were not aware of the purpose of this study. Thus, at the end of the examination, the behaviour of the children was classified through the Frankl behaviour scale.[15] The examiners, who were responsible for observing and recording the behavioural reactions of the participants, were not aware of the purpose of this study and performed independent (blinded) evaluations of the reactions presented by the children.

The PSDQ includes 32 items, where the parents indicate how often they act in a certain way with their child. A five-point Likert scale is used (1 = never, 2 = few times, 3 = sometimes, 4 = often, and 5 = always) for each of the answers, evaluating three parenting styles: democratic, authoritarian, and permissive. The democratic style includes characteristics of support and affection (five items, e.g., 'I praise my child when he behaves or does something well'), regulation (five items, e.g., 'I stress the reasons for the rules I establish'), and autonomy (five items, e.g., 'I encourage my child to express himself freely, even when he does not agree with me'). The authoritarian style includes features of physical pressure (four items, e.g., 'I slap my child when he misbehaves'), verbal hostility (four items, e.g., 'I scream or speak loudly when my child misbehaves'), and punishment (four items, e.g., 'I punish my child by withdrawing privileges with little or no explanation'). The permissive style consists of the single characteristic of indulgence (five items, e.g., 'I more often threaten to punish than really punish him'). Briefly, the 32 items can be grouped into three parenting styles and seven dimensions. Thus, the democratic parenting style includes 15 items that are divided into three dimensions: support and affection, regulation, and autonomy. The authoritarian style has 12 items and consists of three dimensions: physical coercion, hostility, and punishment. The permissive style consists of one dimension, indulgence, which is composed of five items.

Parenting dimensions were calculated by the arithmetic mean of scale items and parenting styles across the arithmetic mean of their dimensions. Therefore, the higher the scores found, the greater the use of their dimensions or styles.[13]

## Data analysis

Data were stored and analysed using SPSS software version 21.0 (SPSS Inc., Chicago, IL, USA). Sociodemographic and economic characteristics (dichotomised in the middle class [B and C] and low class [D and E])[23] were the variables analysed descriptively. The behaviour of the children was dichotomised as positive or negative, and the results associated with the parenting style were obtained through the chi-square test. In addition, an association between parenting styles and sociodemographic and economic characteristics was also achieved using the chi-square test for the categorical variables: educational level of the parents (dichotomised in e" the average school level and < the average school level), enrolled in school, single child, and socio-economic level. ANOVA followed by the Tukey test were used for numerical variables (age of the parents and dmft index).

For the comparison between the means of the parenting styles obtained with the validated questionnaire in Portuguese[12] and the same questionnaire validated for use in Brazil,[13] the T test for paired samples was employed. In addition, a correlation test (Cronbach's alpha = á) among the types of parenting styles obtained through the application of each instrument (Portugal and Brazil) was also added. A 95% confidence interval was adopted for all statistical analyses described, with a significance level of 5%.

## RESULTS

Results were obtained from 67 pairs of parents/children, considering that seven patients did not allow care. The mean age of preschoolers was 4.06 years (± 1.08 years). The mother was the most prevalent respondent (85%); in nine cases, the father (9%) was the interviewee; and in 6% of the total sample, the respondent was not the father or mother. The socioeconomic level was classified as medium in 58.2% of the sample and low in 28 families (42.8%). Table 1 shows the sociodemographic distribution collected.

The majority of preschoolers presented positive behaviour (83.6%), and the mean of the dmft of the study population was 4.76 (± 3.43). Of the total sample of those responsible, 49.3% represented democratic parents, 44.8% permissive parents, and 6% authoritarian parents. There was no statistical difference between the dmft index of preschoolers and the parenting style (p=0.814) (Figure 1). It was observed that a large part of the sample showed positive behaviour, and of the total number of children with negative behaviour (n = 11), seven belonged to the permissive parenting group, four preschoolers were considered as democratic, and no children (n=4) belonging to the group of authoritarian parents presented negative behaviour (p = 0.321) (Table 2).

Table 2 shows that there was no association between parenting styles and the parents' socioeconomic level (p = 0.126), the educational level of the person in charge (p=0.162), whether enrolled in school/nursery care (p =0.480), or a single child (p=0.939). The age of the guardian also had no influence on parenting style, considering both mothers (p=0.361) and fathers (p=0.581). When comparing the results obtained by applying validated questionnaires for Portugal and Brazil (á=0.899), no difference was observed among the means obtained from the democratic (p = 0.943), authoritarian (p = 0.660), and permissive (p = 0.087) parenting styles between the instruments (Table 3).

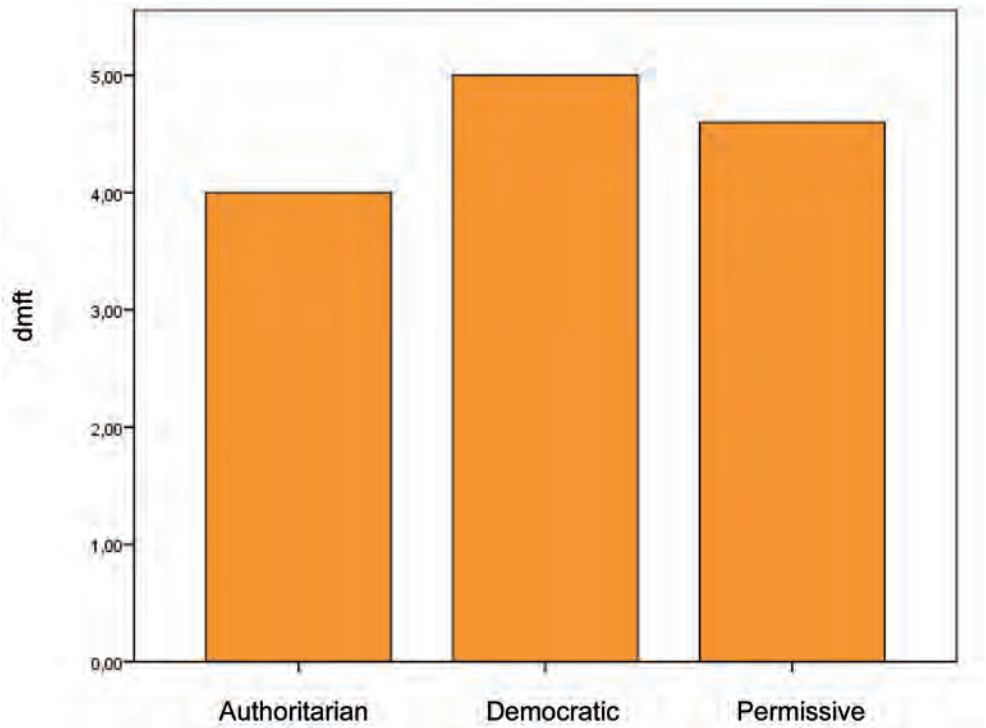


***Figure 1:*** *Association between dmft index and parenting styles of preschoolers (n = 67).*

***Table 1:*** *Characteristics of preschoolers and guardians (n = 67).*

| Variables | N | % |
|---|---|---|
| **Preschoolers Gender** | | |
| Boys | 34 | 50.7 |
| Girls | 33 | 49.3 |
| **Presence of caries** | | |
| Yes | 55 | 82.1 |
| No | 12 | 17.9 |
| **Only child** | | |
| Yes | 19 | 28.4 |
| No | 48 | 71.6 |
| **School / daycare enrollment** | | |
| Yes | 51 | 76.1 |
| No | 16 | 23.9 |
| **Preschoolers' behavior classification** | | |
| Positive | 56 | 83.6 |
| Negative | 11 | 16.4 |
| **Types of Responsible** | | |
| Mother | 57 | 85.0 |
| Dad | 6 | 9.0 |
| Other | 4 | 6.0 |
| **Parenting Styles** | | |
| Democratic | 33 | 49.2 |
| Authoritarian | 4 | 6.0 |
| Permissive | 30 | 44.8 |
| **Educational level of the person in charge** | | |
| ≥ than high school | 37 | 61.7 |
| <that high school | 23 | 38.3 |
| **Socioeconomic level of responsible** | | |
| Medium | 39 | 58.2 |
| Low | 28 | 41.8 |
| **Mean age (years ± SD) of preschoolers** | | |
| 4.06 (± 1,08) | | |
| **Mean age (years ± SD) of mothers** | | |
| 32.51 (±6,67) | | |
| **Parental mean age (years ± SD)** | | |
| 36.32 (±8,23) | | |
| **dmft (± SD)** | | |
| 4.76 (±3,43) | | |

***Table 2:*** *Association between parenting styles with behavior. whether or not to be an only child. attending school and the socioeconomic and cultural level of guardians.*

| Variables | Democratic | | Authoritarian | | Permissive | | *P* valor |
|---|---|---|---|---|---|---|---|
| | N | (%) | N | (%) | N | (%) | |
| ***Behavior*** | | | | | | | 0.321 |
| Positive | 29 | 51.8 | 4 | 7.1 | 23 | 41.1 | |
| Negative | 4 | 36.4 | 0 | 0.0 | 7 | 63.6 | |
| **Only child** | | | | | | | 0.939 |
| Yes | 10 | 52.6 | 1 | 5.3 | 8 | 42.1 | |
| No | 23 | 47.9 | 3 | 6.3 | 22 | 45.8 | |
| ***School / daycare enrollment*** | | | | | | | 0.480 |
| Yes | 24 | 47.1 | 4 | 7.8 | 23 | 45.1 | |
| No | 9 | 56.3 | 0 | 0.0 | 7 | 43.8 | |
| ***Socioeconomic level*** | | | | | | | 0.126 |
| Medium | 17 | 43.6 | 1 | 2.6 | 21 | 53.8 | |
| Low | 16 | 49.3 | 3 | 10.7 | 9 | 32.1 | |
| ***Educational level of guardian*** | | | | | | | 0.162 |
| ≥ that the high school level | 20 | 54.1 | 1 | 2.7 | 16 | 43.2 | |
| <that the high school level | 8 | 34.8 | 3 | 13.0 | 12 | 52.2 | |

***Table 3:*** *Comparison of parenting styles means obtained through the application of validated PSDQ questionnaires for Portugal and Brazil.*

| Parental Style | Portugal(mean ± SD) | Brazil(mean ± SD) | *P* value |
|---|---|---|---|
| *Democratic* | 4.17±0.57 | 4.18±0.26 | 0.943 |
| *Authoritarian* | 2.35±0.53 | 2.46±0.50 | 0.660 |
| *Permissive* | 2.77±0.80 | 2.33±0.75 | 0.087 |

# DISCUSSION

Several factors affect a child's personality and behaviour, and the family environment is decisive in the development and behaviour of children.[3,8] Considering that parenting styles may influence the health[16,17] and behaviour of children[20] and that caries disease control is not limited to mechanical removal of dental plaque, but also an approach to social and behavioural factors related to the disease,[24] investigations about the behaviour of preschoolers, parenting styles, and dental caries are perfectly justifiable.

In the present research, the PSDQ was used as an instrument for data collection, since it evaluates three parenting styles defined by Baumrind[25]: authoritarian, democratic, and permissive. This instrument, consisting of 32 questions, was validated for the Portuguese language to be used in Portugal,[12] and, more recently, it was validated for Brazil.[13] In the data collection period of this study (April 2017 to November 2018), we used the form validated for Portuguese, but used in Portugal. This fact represents a limitation of the present work. However, it is worth mentioning that the authors were careful to compare the instrument validated for Portugal with the same validated questionnaire for Brazil, both of which were applied to the parents of 10 children, with a one-week application interval between both, where it was verified that there was no difference in the averages regarding the democratic, authoritarian, and permissive styles presented by the evaluated sample.

Interest in evaluating parenting styles, especially with the PSDQ,[11] has been growing in recent years.[1,12,13] This instrument, used all over the world, allows multiple perceptions of the same parenting style and different uses, which brings us to diverse associations, increasing validity.[26] In the United States, a 2015 study revealed that the

democratic parenting style was associated with a lower prevalence of caries lesions and better behaviour in children during their first dental appointment.[1] As far as the authors are aware, the present study is the first to investigate the same association in a Brazilian population. However, unlike the results found by the American group, no positive association was observed in the present study among the variables investigated. The authors suggest that such a difference of results may have occurred mainly because a small sample was studied here, since the same order pattern of parenting styles was observed in both studies: democratic, followed by permissive and authoritarian.

Permissive parents allow their child to make decisions, regardless of the degree of complexity involved, in order to keep the child happy.[5] According to Aminabadi and Farahani,[2] the permissive parenting style results in poorer child behaviour during a dental visit.[2] It was observed that of the total sample investigated, 30 children (44.8%) had parents with the permissive style; however, only seven of them had negative behaviour. The authors suggest that although the preschoolers are evaluated during a consultation of only clinical exam procedure, many belong to families already accustomed to the environment and the dynamics of paediatric dentistry clinics at UFRJ, having already seen their siblings examined (most were not an only child: 71.6%), making these children more cooperative, besides the type of consultation (prophylaxis) and the professional (paediatric dentist). This fact can be seen with the large percentage of positive behaviour (83.6%). Our research did not indicate an association between any of the parenting styles with caries lesions in preschool children, nor with the socioeconomic level of the families investigated. This is not consistent with another study,[1] because the authors of this study found that democratic parenting results in more cooperative behaviour of preschoolers and fewer caries lesions in such a population. This study also showed that those with private health insurance (hypothetically higher income) presented better behaviour and fewer caries lesions compared to others who did not have private health insurance.

Although the preschool children were attended by different dentists, which could be viewed as a bias, all patients were submitted to a clinical examination visit with prophylaxis, which means that they were submitted to the same procedure. Moreover, the dentists were postgraduate students from UFRJ, that are trained by the same professors.

In view of the results found, in which no positive association was observed, future studies with a larger population are necessary in order to further investigate the relationship among parenting styles, child behaviour, and dental caries in the paediatric dental environment.

## ACKNOWLEDGEMENT

The authors acknowledge the financial support from Fundação de Amparo à Pesquisa do Estado do Rio de Janeiro (FAPERJ).

## REFERENCES

1- Dr Jeff Howenstein, DMD, MS1; Dr Ashok Kumar, DDS, MS2; Dr Paul S. Casamassimo, DDS, MS3; Dr Dennis McTigue, DDS, MS4; Dr Daniel Coury, MD5; and Dr Han Yin, PhD6, published in final edited form as: Pediatr Dent. 2015;37(1):59–64.

2- Aminabadi NA, Farahani RM. Correlation of parenting style and pediatric behavior guidance strategies in the dental setting: preliminary findings. Acta Odontol Scand. 2008;66:99–104. [PubMed: 18446551].

3- Allen KD, Hutfless S, Larzelere R. Evaluation of two predictors of child disruptive behavior during restorative dental treatment. J Dent Child. 2003;70:221–5.

4- Baumrind, D. Effects of authoritative parental control on child behavior. Child Development 1966;37:255–72.

5- Baumrind D. Current patterns of parental authority. Dev Psychol Monogr. 1971;4:1–103.

6- Baumrind D. Parental disciplinary patterns and social competence in children. Youth Soc. 1978;9:239–51.

7- Devore, Elise R, Ginsburg, Kenneth R. The protective effects of good parenting on adolescents. Current Opinion in Pediatrics 2005;17:460–5.

8- Darling N, Steinberg L. Parenting style as context: An integrative model. Psychological Bulletin 1993;113(3):487–96.

9- Baier K, Milgrom P, Russell S, Mancl L, Yoshida T. Children's fear and behavior in private pediatric dentistry practices. Pediatr Dent. 2004;26:316–21. [PubMed:15344624].

10- Brill WA. The effect of restorative treatment on children's behavior at the first recall visit in a private pediatric dental practice. J Clin Pediatr Dent. 2002;26:389–93. [PubMed:12175134].

11- Robinson C, Mandleco B. Authoritative, authoritarian, and permissive parenting practices: development of a new measure. Psychol Rep. 1995;77:1.

12- Miguel I, Valentim JP, Carugati F. Questionário de estilos e dimensões parentais – versão reduzida: adaptação portuguesa do Parenting Styles and Dimensions Questionnaire – Short Form. Psychologica 2009;51:169–88.

13- Oliveira TD, Costa SD, Albuquerque MR, Malloy-Diniz LF, Miranda DM, Paula JJ. Cross-cultural adaptation, validity, and reliability of the Parenting Styles and Dimensions Questionnaire – Short Version (PSDQ) for in Brazil. Psychiatry 2018;40:410–9.

14- Querido JG, Warner TD, Eyberg SM. Parenting styles and child behavior in African American families of preschool children. J Clin Child Adolesc Psychol. 2002;31:272–7. [PubMed: 12056110].

15- Frankl SN, Shiere FR, Fogels HR. Should the parent remain with the child in the dental operatory? J Dent Child 1962;29(2):150–63.
16- O'Connor TM, Yang SJ, Nicklas TA. Beverage intake among preschool children and its effect on weight status. Pediatrics 2006;118:e1010–8. [PubMed: 17015497].
17- Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999–2004. JAMA 2006;295:1549–55. [PubMed: 16595758].
18- Johnson R, Welk G, Saint-Maurice PF, Ihmels M. Parenting styles and home obesogenic environments. Int J Environ Res Public Health 2012;9:1411–26. [PubMed: 22690202].
19- Brasil MS/SAS. SB Brasil 2010. Pesquisa Nacional de Saúde Bucal. Disponível em: www.saúde.gov.br. 2010.
20- Tsoi AK, Wilson S, Thikkurissy S. A study of the relationship of parenting styles, child temperament, and operatory behavior in healthy children. J Clin Pediatr Dent 2018;42(4):273–8.
21- WHO. WHO expert consultation on public health intervention against early childhood caries: report of a meeting, Bangkok, Thailand, 26–28 January 2016. Geneva: World Health Organization, 2017 (WHO/NMH/PND/17.1). Licence: CC BY-NC-SA 3.0 IGO.
22- ABEP, Associação Brasileira de Empresas de Pesquisa. Disponível em: www.abep.org.2010.
23- Vollú AL, Da Costa MEPR, Maia LC, Fonseca-Gonçalves A. Evaluation of oral health-related quality of life to assess dental treatment in preschool children with early childhood caries: a preliminary study. Journal of Clinical Pediatric Dentistry 2018;42:37–44.
24- Seabra LCSR, Melo RR, Gomes VE, Oliveira AC, Ferreira EF. Fatores sociais comportamentais e biológicos associados à presença de placa dentária na superfície occlusal de primeiros molars permanentes. 10.7308/aodontol/2012.48.02.
25- Baumrind D. Child care practices anteceding three patterns of pre-school behaviour. Genetic Psychology Monographs 1967;75:43–88.
26- Olivari MG, Tagliabue S, Confalonieri E. Parenting style and dimensions questionnaire: a review of reliability and validity. Fog 2013;49:465-90.

# ORAL HEALTH STATUS OF PATIENTS IN INTENSIVE CARE UNIT: A CROSS-SECTIONAL STUDY

Renata de Moura Cruz **Quintanilha**[1], Mara Regina Rocha **Pereira**[1], Silvia Paula de **Oliveira**[1], Cláudia de S. Thiago **Ragon**[1], Michelle **Agostini**[2], Arley Silva **Júnior**[2], Diamantino Ribeiro **Salgado**[3], Sandra R. **Torres**[2*]

[1]Oral Health Program, Hospital Universitário Clementino Fraga Filho; Universidade Federal do Rio de Janeiro – UFRJ, RJ, Brazil.
[2]Department of Oral Diagnosis and Pathology; Head of Oral Health Program, Hospital Universitário Clementino Fraga Filho; Universidade Federal do Rio de Janeiro – UFRJ, RJ, Brazil.
[3]Department of Internal Medicine do Hospital Universitário Clementino Fraga Filho; Universidade Federal do Rio de Janeiro – UFRJ, RJ, Brazil.

**Palavras-chave**: Unidade de Terapia Intensiva. Manifestações Orais. Mucosa bucal. Higiene Oral. Úlceras Orais e Saliva.

**RESUMO**

**Introdução**: Pacientes em unidade de terapia intensiva (UTI) podem apresentar alterações orais como resultado das condições sistêmicas dos pacientes, uso de medicamentos, intubação ou falta de higiene bucal. Alterações orais devem ser detectadas e tratadas, pois podem agravar a condição do paciente. O objetivo deste estudo foi avaliar os tipos e frequências de alterações orais clinicamente detectadas em pacientes internados em uma UTI. **Métodos**: Estudo transversal em que foi realizada avaliação oral de pacientes internados em uma UTI de um hospital público. Características demográficas, sociais e clínicas foram coletadas dos prontuários médicos. Os exames orais foram realizados por dois dentistas treinados, com confiabilidade verificada pelo coeficiente de correlação intra-classe, enquanto os pacientes estavam deitados na cama do hospital, utilizando frontal, abaixador de língua e gaze estéril. Todos os dados foram registrados em formulários de protocolo do estudo e transferidos para uma base de dados para análise. **Resultados**: Foram avaliados 37 pacientes, com distribuição semelhante entre os sexos, com mediana de idade de 62 anos. As causas mais frequentes de internação foram cuidados pós-operatórios (51,35%) e problemas respiratórios (29,72%). Cerca de 90% dos pacientes internados apresentaram algum tipo de alteração bucal durante o período de internação. As alterações clínicas mais comuns foram lábios secos (86,5%); língua (61,1%); palidez da mucosa oral (54,1%); focos orais de infecção (37,8%) e candidíase (13,5%). **Conclusão**: A maioria dos pacientes internados em UTI apresentou algum tipo de alteração oral, sendo os mais frequentes lábios secos e língua. Os dados observados neste estudo reforçam a necessidade do apoio da equipe odontológica durante o período de internação.

**Keywords**: Intensive Care Unit. Oral Manifestations. Oral Mucosa. Oral Hygiene. Oral Ulcers and Saliva.

**ABSTRACT**

**Introduction:** Patients in intensive care unit (ICU) may present oral alterations as a result of patients' systemic conditions, the use of medications, intubation or poor oral hygiene. Oral alterations should be detected and treated because they may aggravate patients' condition. The objective of this study was to evaluate the types and frequencies of clinically detected oral alterations in inpatients of an ICU. **Methods:** This is a cross-sectional study in which an oral evaluation of patients hospitalized in an ICU of a public hospital was performed. Demographic, social and clinical characteristics were collected from medical records. Oral exams were performed by two trained dentists, with reliability checked by intra-class correlation coefficient, while patients were lying in the hospital bed, using a frontal headlamp, tongue depressor and sterile gauze. All data were recorded in study protocol forms and transferred to a data base for analysis. **Results:** Thirty-seven patients, with similar distribution between genders, with median age of 62 years were evaluated. The most frequent causes for hospitalization were postoperative care (51.35%) and respiratory problems (29.72%). About 90% of the inpatients presented some type of oral alterations during the hospitalization period. The most common clinical alterations were dry lips (86.5%); coated tongue (61.1%); paleness of the oral mucosa (54.1%); oral foci of infection (37.8%) and candidiasis (13.5%). **Conclusion:** The majority of inpatients of the ICU presented some type of oral alteration, and the most frequent were dry lips and coated tongue. Data observed in this study reinforce the need of the dental team support during the period of hospitalization.

Submitted: December 11, 2019
Modification: January 14, 2020
Accepted: January 19, 2020

***Correspondence to:**
Sandra R. Torres
Address: Av. Carlos Chagas Filho 373 - Prédio do CCS - Bloco K - 2° andar - Sala 56. Ilha da Cidade Universitária – Rio de Janeiro/RJ - CEP: 21.941-902
Telephone number: + 55 (21) 3938-2012
E-mail: sandratorres@odonto.ufrj.br

## INTRODUCTION

Inpatients of intensive care units (ICU) are continuously monitored, because they present critical conditions, and may be at imminent risk for complications of the diseases or of death.[1] In the hospital environment, patients are more susceptible to infections due to their compromised systemic condition, the environment and the procedures to which they are submitted to.[2,3] During the period of admission in the ICU, patients may develop oral changes which may be associated with the underlying diseases, use of medications, equipment for artificial respiration, or poor oral hygiene.[2,3,4,5,6] In addition, oral infections, may be associated to systemic complications, like nosocomial pneumonia, which is responsible for 20 to 50% deaths of patients in ICU.[2,3,7]

Some oral features, such as dry lips, coated tongue or candidiasis, have been reported in patients hospitalized in the ICU and can cause more harm to these patients undergoing a critical phase.[2,3,7,8,9] Patients from ICU may also have pre-existing oral conditions such as caries, periodontal disease and absence of teeth.[2,3,7]

The importance of the oral care in the evolution and recovery of patients hospitalized in the ICU has been reported.[10] The assessment and treatment of oral conditions of patients admitted in the ICU may contribute to infection control within the hospital environment. However, until recently the dental team was not included in the multidisciplinary ICU team. Therefore, the objective of this study was to evaluate the types and frequencies of oral alterations clinically detected in ICU patients.

## MATERIALS AND METHODS

This cross-sectional study was performed with the data collected on dental visits to the ICU of the Hospital Clementino Fraga Filho (HUCFF) from the Universidade Federal do Rio de Janeiro (UFRJ), within the period from September 2015 to February 2016. This ICU, is not exclusive of any medical specialty, and receives patients with a variety of causes of hospitalization. The study was approved by the Research Ethics Committee of the HUCFF, under protocol 44105815000005257. All patients or their representatives signed a consent form.

The study sample was composed by patients admitted to the ICU and who were submitted to routine oral examination. Patients who could not be examined because of physical or technical difficulties, those who did not allow the oral exam, or were not willing to participate were excluded from the study.

Data related to social, demographic and clinical characteristics were collected from the medical records. Patients informed if oral hygiene was being performed. If patients were unconscious, the information was obtained through a family member, or the nursing team in charge.

Oral exams were performed simultaneously by two dentists of the Oral Health Program, of the HUCFF. The professionals were properly qualified for the oral examination and they were supervised by a stomatology specialist. To verify the reliability of the evaluation, slides of normal and altered oral mucosa were projected and analyzed by the two investigators. The intra-class correlation coefficient for each one of the examiners were 0.80 and 0.70 (95% confidence interval: 0.59-0.93), respectively, when compared to the specialist.

The patients were examined in the hospital bed by professionals using personal protective equipment, a light emitting diode (LED) frontal headlamp, tongue depressors and sterile gauzes. In cases of intubated patients, the exams were assisted by a nurse, in order to assure security in the positioning of the orotracheal tube. A study protocol form was used to record the collected data.

The diagnoses of the oral alterations were based on established concepts in the literature, with the following specific definitions:

• Coated tongue was considered as the presence of white-yellowish material at the surface of the tongue, which may be removable by gauze soaked in sterile saline solution.[11]

• Dry lips were diagnosed when the vermillion border was opaque, friable, or presented desquamation, ulcerations, fissures or crusts.[12]

• Oral dryness was defined as a reduction or absence of saliva, characterized by the absence of the "sublingual saliva lake" or the adherence of wooden tongue depressor to the buccal mucosa.[12]

• The saliva was considered viscous, when it was thick and adherent presenting foamy aspect.[12]

• Candidiasis was diagnosed clinically, when one or more of the following oral changes were present: fissures or erythematous plaques in the labial commissures which may extend over the adjacent skin (angular cheilitis); white-yellowish removable plaques (pseudomembranous candidiasis); erythematous plaques (atrophic or erythematous candidiasis); and non-removable white plaques (hyperplastic candidiasis), not suggestive of any other oral lesions. [13]

Data storage and statistics analysis were performed in the SPSS 20.0 (Statistical Package for the Social Sciences) software program (IBM, New York, USA). A descriptive analysis was performed for the distribution and frequency of the collected data. Chi-square or Fisher's exact tests were used to check for differences between dichotomous variables, and Mann-Whitney for measurable variables.

## RESULTS

Thirty-seven patients admitted to the ICU of the HUCFF were included in the study. Table 1 shows the demographic and clinical characteristics of these patients. The most frequent cause of hospitalization was postoperative recovery, followed by respiratory and neurological conditions. There was a wide variation in the length of stay in the ICU, varying from 1 to 82 days. The most common underlying diseases were, malignant conditions and diabetes, with similar distribution between men and women. The most frequent complications in these patients from the ICU were respiratory problems, followed by septicemia. Six patients (16.2%) were intubated by the time of the oral exam and 12 (32.4%) had been previously intubated, for a period of 1 to 20 days. Among the drugs used during the period of hospitalization, antacid/antiulcer (89.2%), analgesics (81.1%), anticoagulants (73.0%), antiemetics (70.3%) and antibiotics (56.8%) were the most frequent.

Most of the patients (94.5%) presented some type of alteration in the oral mucosa, or in the vermillion border. The oral alterations observed in the 37 patients in the ICU are shown in Table 2. The majority of patients presented dry lips (86.5%), coated tongue (61.1%) and paleness of the oral mucosa (54.1%). Oral manifestations of blood dyscrasia were detected in 2 patients (5.4%). Among the 20 patients who had pale mucosa, 90% of them exhibited some degree of anemia. One of the patients with oral dryness developed crusts on the tongue.

Oral foci of infection were detected in 14 patients (37.8%). There were 25 (67.6%) patients with dental prosthesis, and the majority of them were instructed not to use the prosthesis during ICU hospitalization. Oral hygiene performed by the nursing staff was recorded for 32 (86.5%) patients.

***Table 1:*** *Demographic and clinical characteristics of the 37 patients evaluated in the intensive care unit.*

| Characteristics | Total | |
|---|---|---|
| | N = 37 | 100% |
| **Age** | | |
| Median (range) | 62 (17-94) | |
| **Cause of hospitalization** | | |
| Postoperative | 19 | 51.35 |
| Respiratory | 11 | 29.72 |
| Neurological | 10 | 27.02 |
| Septicemia | 8 | 21.62 |
| Gastrointestinal | 8 | 21.62 |
| Malignant condition | 6 | 16.21 |
| Cardiac | 5 | 13.51 |

***Note****: *Patients may present more than one disease or complication and were taking more than one type of medication.*

***Table 2**: Oral alterations observed in the 37 evaluated patients from an intensive care unit.*

| Characteristics observed during oral examination* | Total | | Male | | Female | |
|---|---|---|---|---|---|---|
| | N=37 | 100% | N= 18 | 48.6% | N=19 | 51.4% |
| **Alterations of the vermillion border** | 33 | 89.2 | 14 | 77.8 | 19 | 100 |
| Dry lips | 32 | 86.5 | 14 | 77.8 | 18 | 94.7 |
| Ulcer/crusts | 5 | 13.5 | 2 | 11.1 | 3 | 15.8 |
| **Alterations of the oral mucosa** | 35 | 94.6 | 16 | 45.7 | 19 | 54.3 |
| Coated tongue | 22 | 61.1 | 9 | 52.9 | 13 | 68.4 |
| Paleness of the mucosa | 20 | 54.1 | 10 | 55.6 | 10 | 52.6 |
| andidiasis** | 5 | 13.5 | 1 | 5.6 | 3 | 15.8 |
| Lesions caused by injuries | | | | | | |
| Bruises | 2 | 5.4 | 0 | 0 | 2 | 10.5 |
| Traumatic ulcer | 2 | 5.4 | 1 | 5.6 | 1 | 5.3 |
| Focal fibrous hyperplasia | 1 | 2.7 | 0 | 0 | 1 | 5.3 |
| Depapillated tongue | 4 | 10.8 | 2 | 11.1 | 2 | 10.5 |
| Mucositis | 1 | 2.7 | 0 | 0 | 1 | 5.3 |
| **Oral manifestations of blood dyscrasia** | | | | | | |
| Petechiae | 1 | 2.7 | 0 | 0 | 1 | 5.3 |
| Spontaneous bleeding | 1 | 2.7 | 0 | 0 | 1 | 5.3 |
| **Salivary alterations** | | | | | | |
| Oral dryness | 16 | 40.5% | 8 | 44.4 | 7 | 36.8 |
| Viscous saliva | 14 | 37.8 | 7 | 38.9 | 7 | 36.8 |
| **Oral foci of infection** | 14 | 37.8 | 9 | 50 | 5 | 26.3 |
| Residual roots | 7 | 18.9 | 5 | 27.8 | 2 | 10.5 |
| Gingivitis | 6 | 16.2 | 5 | 27.8 | 1 | 5.3 |
| Others (tooth decay and calculus) | 7 | 18.9 | 5 | 27.8 | 2 | 10.5 |
| **Characteristics of dental prosthesis** | | | | | | |
| Usage of dental prosthesis | 25 | 67.6 | 1 | 61.1 | 14 | 73.7 |
| Type of dental prosthesis | | | | | | |
| Partial removable prosthesis | 2 | 5.4 | 1 | 5.6 | 1 | 5.3 |
| Total prosthesis | 19 | 51.4 | 8 | 44.4 | 11 | 57.9 |
| Total and partial prosthesis | 4 | 10.8 | 2 | 11.1 | 2 | 10.5 |
| **Anatomic location of dental prosthesis** | | | | | | |
| Upper jaw | 6 | 16.2 | 2 | 11.1 | 4 | 21.1 |
| Lower jaw | 1 | 2.7 | 1 | 5.6 | 0 | 0 |
| Upper and lower jaw | 18 | 48.6 | 8 | 44.4 | 10 | 52.6 |
| **Used prosthesis during hospitalization** | 3 | 8.1 | 1 | 5.6 | 2 | 10.5 |

***Note**: *Patients could present more than one type of oral alteration. **Clinically diagnosed during the visit to the intensive care unit.*

## DISCUSSION

Little is known about the oral changes that occur during the period of hospitalization in the ICU. In the present study, some type of oral alteration was presented by the majority of the ICU inpatients. Dry lips were the most frequently observed oral alteration, followed by coated tongue, paleness of the oral mucosa, altered saliva viscosity and oral foci of infection, respectively. Early detection of these alterations is important, because some of these conditions may cause complications, especially in the frail hospitalized patient of an ICU. Oral exams should be part of the routine investigation of patients in the ICU, so oral features can be properly addressed.

Dry lips may be a result of the medical treatment related to hospitalization.[12,14,15] The desiccation may result in fissures and ulcerations in the vermillion border, which are hard to heal, and may be painful, uncomfortable and also facilitate infection.[16] This condition was previously reported in 1.79% to 86,3% [17,18] of patients hospitalized in an ICU. In the present study, dry lips were observed in 86.5% of the patients. An explanation for this discrepancy is that a diagnostic criterion was not standardized in the other studies.

Patients in ICU may present many predisposing factors for coated tongue, which may explain the high frequency of this condition on the studied population (61%). The coated tongue acts as a reservoir of microorganisms, and it is characterized by the accumulation of a biofilm formed basically by mucin, food remains, exfoliated epithelial cells, fungi, bacteria and active enzymes.[11,19,20] During the intubation procedure, the biofilm may be dislodged to the respiratory tract, and has been associated to pneumonia caused by artificial ventilation.[6,7,20] Factors like difficulties to perform oral hygiene, reduction of the salivary flow rates, reduction in tongue motility, and the sedated or constant sleep state of patients do not allow the elimination of exfoliated epithelial cells, and may promote the development of the condition.[11,20] Moreover, tracheal intubation, and the length of hospitalization, may also favor the accumulation of oral biofilm and colonization of the oropharynx, leading to halitosis.[19,21] Some drugs may change the quality of saliva, which in turn, may lead to xerostomia. [22,15] Changes in sialochemistry alter the salivary function and viscosity, favoring bacterial aggregation, thus increasing the accumulation of the tongue biofilm. This biofilm is implied in the pathogenesis of ventilator-associated pneumonia[23] The altered viscosity in saliva was frequently observed in the ICU patients (37.8%).

Quantitative changes in salivary flow rates also occur, but it is difficult to assess salivary flow rates in patients in ICU, because the patient is unable to cooperate, due to the use of analgesics and sedatives.[24] Therefore, clinical parameters were used in the methodology of this study to detect salivary changes. Oral dryness, detected as the absence of sublingual saliva accumulation was observed in 40.5% of the patients. The most common cause of hyposalivation is the use of xerogenic drugs, such as diuretics, laxatives, antacids, anorexics, anti-hypertensive, antidepressants, antipsychotics, sedatives, anti-histamines, anticholinergic and antiparkinsonians, which were often used by patients in the study.[25,26] Many systemic conditions, situations of stress and dehydration that affect these patients, may also be responsible for hyposalivation.[24] In addition, oral dryness caused by the air pathway through the oral cavity may occur in the intubated patient.[22,27]

Paleness of the oral mucosa is a sign associated to anemia, which is very common in ICU inpatients.[3,27,28] There is no information if this oral condition could affect the oral defenses, but some studies have shown that anemia is associated with adverse outcomes in acute myocardial infarction, chronic kidney disease, and chronic heart failure and increased risk of re-intubation or weaning failure from mechanical.[28,29]

The oral microbiota of ICU inpatients may present an imbalance due to local and systemic changes, such as poor oral hygiene, reduction of the salivary flow rates, immune status, influence of drug therapy and hospital environment, which may lead to intense oral colonization by *Candida* species.[17,18,30] Candidiasis is the oral infection that mostly affects patients in hospital units. [9] As a result of candidiasis, patients may present dysgeusia, oral burning, local pain and dysphagia, leaving the patient susceptible to malnutrition, and slow recovery, in a way that, duration of hospitalization may be longer.[31,32] In the critically ill patient, oral candidiasis may invade the gastrointestinal tract[33,34] or the bloodstream (candidemia), and lead to death.[35,36] Oral candidiasis was observed in about 13.5% of the studied patients. Similar results were found in another study conducted in an ICU of oncologic patients[18] but they differ from another study, in which candidiasis was diagnosed in 68% of patients.[4] One important fact is that in the present study, the diagnoses were based on physical exams only. Neither cytology, nor *Candida* culture were performed by the time of oral examinations. Maybe, laboratory tests could detect subclinical candidiasis, and show increased frequency of *Candida* infection.

The traumatic ulcers of the oral mucosa were located on the lips and tongue (5.4%). This was expected, since these lesions are associated with intubation maneuvers and involuntary muscle spasms, which may traumatize the

mucosa, and are frequently observed in these patients.[37] In studies carried out in other ICU, traumatic ulcers associated to orotracheal intubation were observed from 10% to 17% of the patients.[4,18] The presence of these lesions impairs the patient's recovery, because they may favor the development of secondary infections and increase the risk of septicemia. In addition, they can be a cause for major bleeding of the mucous membranes.[38] The treatment of ulcers may be related to an increase in the time of hospitalization and hospital costs. [6,37,39]

Oral exams of patients lying in bed are difficult because of the lighting conditions, the non-ergonomic professional position, and the presence of the orotracheal tube. The lack of availability of x-ray images to complement the physical exam also makes the diagnosis difficult. Therefore, no index was used for dental and periodontal examination. The presence of residual roots, dental caries, calculus or gingivitis was observed in approximately 40% of the assessed patients. Other authors have also reported the presence of oral foci of infection in 28% of individuals examined in ICU.[4] These polymicrobial processes, formed by aerobic and anaerobic bacteria, may lead to infectious outbreaks during patient's admission. [7,40] If not properly diagnosed and treated, an odontogenic infection may aggravate the health condition, leading to airway impairment, sepsis and death.[41,42]

Approximately 70% of hospitalized patients wore some type of dental prosthesis, while in another study, conducted in similar conditions, only 30% had some type of prosthesis.[11] The large number of patients with dental prostheses is a sign of the poor oral health status of the studied population.

There are some limitations in this study. The small sample size and the heterogeneous population do not permit important conclusions. The duration of hospitalization may increase the incidence of oral features, but cross-sectional studies do not infer causality in the association of these alterations and the *temporality* of ICU hospitalization. Longitudinal studies, with larger populations should be performed in future studies, in order to properly address these questions.

Dentists should be part of the multiprofessional hospital team that attends patients hospitalized in the ICU.[6] For those patients admitted for elective surgery, a previous referral for dental evaluation would be ideal. Oral infections may aggravate systemic conditions or increase the risk for other diseases.[3] Preventive and therapeutic oral procedures for are important to avoid complications of the systemic condition and recovery of patients in the ICU.[22]

# CONCLUSION

The majority of patients presented some type of oral alteration related to the admission in the ICU, and the most frequent ones were dry lips and coated tongue.

## Aknowledgements

We thank the ICU team of the Clementino Fraga Filho University Hospital (UFRJ) for their outstanding support and assistance during the study.

# REFERENCES

1. Araújo RJG de, Oliveira LCG de, Hanna LMO, Corrêa AM, Carvalho LHV, Alvares NCF. Perceptions and actions of oral care performed by nursing teams in intensive care units. Rev Bras Ter intensiva [Internet]. 2009;21(1):38–44. Available from: http://www.ncbi.nlm.nih.gov/pubmed/25303127

2. Atay S, Karabacak K. Oral care in patients on mechanical ventilation in intensive care unit: literature review. Int J Res Med Sci. 2014;2(3):822–9.

3. Silva JL da;, Kadre, Guaniara D'Arc de O El Kudoa GA, Santiago Junior JF;, Saraiva PP. Oral Health of Patients Hospitalized in the Intensive Care Unit. J Contemp Dent Pract. 2016;17(2):125–9.

4. Baeder FM, Cabral GMP, Prokopowitsch I, Araki ÂT, Duarte DA, Santos MTBR. Condição Odontológica em Pacientes Internados em Unidade de Terapia Intensiva. Pesqui Bras Odontopediatria Clin Integr. 2012 Dec 29;12(4):517–20.

5. Kahn S, Garcia CH;, Galan Junior J;, Namen FM;, Machado WAS;, Silva Junior, Joel Alves/; Eleanor Mobley Scofield Sardenberg EMS;, et al. Avaliação da existência de controle de infecção oral nos pacientes internados em hospitais do estado do Rio de Janeiro. Cien Saude Colet. 2008;13(6):1825–31.

6. Morais TMN, Silva A da, Avi ALR de O, Souza PHR de, Knobel E, Camargo LFA. A Importância da Atuação Odontológica em Pacientes Internados em Unidade de Terapia Intensiva. Rev Bras Ter Intensiva. 2006;18(4):412–7.

7. Oliveira L, Carneiro P, Fischer R, Tinoco E. A Presença de Patógenos Respiratórios no Biofilme Bucal de Pacientes com Pneumonia Nosocomial. Rev Bras Ter Intensiva. 2007;19(4):428–33.

8. Elangovan S, Nalliah R, Allareddy V, Karimbux NY, Allareddy V. Outcomes in patients visiting hospital emergency departments in the United States because of periodontal conditions. J Periodontol [Internet]. 2011 Jun [cited 2014 Aug 19];82(6):809–19. Available from: http://www.ncbi.nlm.nih.gov/pubmed/21138352

9. Badiee P, Alborzi A, Joukar M. Molecular assay to detect nosocomial fungal infections in intensive care units. Eur J Intern Med [Internet]. European Federation of Internal Medicine.; 2011;22(6):611–5. Available from: http://dx.doi.org/10.1016/j.ejim.2011.08.025

10. Teng YTA, Taylor GW, Scannapieco F, Kinane DF, Curtis M, Beck JD, et al. Periodontal health and systemic disorders. J Can Dent Assoc. 2002;68(3):188–92.

11. Cruz MK da, Morais TMN de, Trevisani DM. Clinical assessment of the oral cavity of patients hospitalized in an intensive care unit of an emergency hospital. Rev Bras Ter Intensiva. 2014;26(4):379–83.

12. Tanasiewicz M, Hildebrandt T, Obersztyn I. Xerostomia of various etiologies: A review of the literature. Adv Clin Exp Med. 2016;25(1):199–206.

13. Pallavan B, Ramesh V, Dhanasekaran BP, Oza N, Indu S, Govindarajan V. Comparison and correlation of candidal colonization in diabetic patients and normal individuals. J Diabetes Metab Disord. 2014;13(1):66.
14. Puntillo K, Arai SR, Cooper BA, Stotts NA, Nelson JE. A randomized clinical trial of an intervention to relieve thirst and dry mouth in intensive care unit patients. Intensive Care Med. Springer Verlag; 2014;40(9):1295–302.
15. Scully C. Drug effects on salivary glands: dry mouth. Oral Dis. 2003;9(4):165–76.
16. Beraldo CC, De Andrade D. Oral hygiene with chlorhexidine in preventing pneumonia associated with mechanical ventilation. J Bras Pneumol. 2008;34(9):707–14.
17. Pires JR, Matareli S, Ferreira RG, Toledo BEC de. Espécies de Candida e a condição bucal de pacientes internados em Unidade de Terapia Intensiva. Rev Assoc Paul Cir Dent. 2011;65(5):332–7.
18. Silva AP, Caruso P, Jaguar GC, Carvalho PAG, Alves FA. Oral evaluation and procedures performed by dentists in patients admitted to the intensive care unit of a cancer center. Support Care Cancer. 2014;22(10):2645–50.
19. Cortelli JR, Barbosa MDS, Westphal MA. Halitosis: a review of associated factors and therapeutic approach. Braz Oral Res. 2008;22 Suppl 1:44–54.
20. Santos PS da S, Mariano M, Samaan; KM, Vilela MC. Impact of tongue biofilm removal on mechanically ventilated patients. Rev Bras Ter Intensiva. 2013;25(1):44–8.
21. Madhushankari GS, Yamunadevi A, Selvamani M, Mohan Kumar KP, Basandi PS. Halitosis - An overview: Part-I - Classification, etiology, and pathophysiology of halitosis. J Pharm Bioallied Sci. 2015;7(Suppl 2):S339-43.
22. Berti-Couto S de A, Couto-Souza PH, Jacobs R, Nackaerts O, Rubira-Bullen IRF, Westphalen FH, et al. Clinical diagnosis of hyposalivation in hospitalized patients. J Appl Oral Sci. 2012;20(2):157–61.
23. Souza LCD, Mota VBR da, Carvalho AVDSZ de, Corrêa R da GCF, Libério SA, Lopes FF. Association between pathogens from tracheal aspirate and oral biofilm of patients on mechanical ventilation. Braz Oral Res. 2017 Jun 5;31:e38.
24. Falcão DP, Mota LMH da, Pires AL, Bezerra ACB. Sialometry: aspects of clinical interest. Rev Bras Reumatol (English Ed [Internet]. 2013 Nov;53(6):525–31. Available from: https://linkinghub.elsevier.com/retrieve/pii/S2255502113000114
25. Scully C, Bagan J V. Adverse drug reactions in the orofacial region. Crit Rev Oral Biol Med. 2004;15(4):221–39.
26. Pedrazas CHS, Azevedo MNL de, Torres SR. Manejo do paciente com hipossalivação. Rev PerioNews. 2007;1(4):369–73.
27. Lu SY. Perception of iron deficiency from oral mucosa alterations that show a high prevalence of Candida infection. J Formos Med Assoc. Elsevier B.V.; 2016 Aug 1;115(8):619–27.
28. McEvoy MT, Shander A. Anemia, bleeding, and blood transfusion in the intensive care unit: Causes, risks, costs, and new strategies. Am J Crit Care. 2013;Volume 22(6):eS1-eS13.
29. Hayden SJ, Albert TJ, Watkins TR, Swenson ER. Anemia in critical illness: Insights into etiology, consequences, and management. Am J Respir Crit Care Med. 2012;185(10):1049–57.
30. Watkins R, Mukherjee P, Chandra J, Retuerto M, Guidry C, Haller N, et al. Admission to the Intensive Care Unit is Associated With Changes in the Oral Mycobiome. J Intensive Care Med. 2017;32(4):278–82.
31. Akpan A, Morgan R. Oral candidiasis. Postgrad Med J [Internet]. 2002 Aug;78(922):455–9. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1742467&tool=pmcentrez&rendertype=abstract
32. Abidia RF. Oral care in the intensive care unit: a review. J Contemp Dent Pract [Internet]. 2007 Jan 1 [cited 2014 Aug 26];8(1):76–82. Available from: http://www.ncbi.nlm.nih.gov/pubmed/17211508
33. McNeill HE. Biting back at poor oral hygiene. Intensive Crit Care Nurs [Internet]. 2000 Dec;16(6):367–72. Available from: http://www.ncbi.nlm.nih.gov/pubmed/11091468
34. Grap JM, Munro CL, Ashtiani B, Bryant S. Oral care interventions in critical care: frequency and documentation. American Journal of Critical Care. Oral care Interv Crit care Freq Doc Am J Crit Care. 2003;12(800):12:113-9.
35. S G, AJ K, J K. Candidemia in intensive care unit patients: a one year study from a tertiary care center in South India. J Postgr Med. 2013;59(3):190–5.
36. Mojazi Amir H, Frandah W, Colmer-Hamood J, Raj R, Nugent K. Risk factors of Candida colonization in the oropharynx of patients admitted to an intensive careunit. J Mycol Med. 2012;22(4):301–7.
37. Rabelo GD, Queiroz CI de, Santos PS da S. Atendimento odontológico ao paciente em unidade de terapia intensiva. Arq Med Hosp Fac Cienc Med St Casa São Paulo. 2010;55(2):67–70.
38. Pinto DM de, Schons E dos S, Busanello J, Costa VZ da. Patient safety and the prevention of skin and mucosal lesions associated with airway invasive devices. Rev da Esc Enferm. 2015;49(5):775–82.
39. Yamanaka R, Soga Y, Moriya Y, Okui A, Takeuchi T, Sato K, et al. Management of Lacerated and Swollen tongue after convulsive seizure with a mouth protector: Interprofessional collaboration including dentists in intensive care. Acta Med Okayama. 2014;68(6):375–8.
40. Flynn TR, Shanti RM HC. Severe odontogenic infections, part 2: prospective outcomes study. J Oral Maxillofac Surg. 2006;54(7):1104–13.
41. Rautemaa R, Lauhio A, Cullinan MP, Seymour GJ. Oral infections and systemic disease - An emerging problem in medicine. Clin Microbiol Infect [Internet]. European Society of Clinical Infectious Diseases; 2007;13(11):1041–7. Available from: http://dx.doi.org/10.1111/j.1469-0691.2007.01802.x
42. Handley TPB, Devlin MF, Koppel DA, McCaul JA. The sepsis syndrome in odontogenic infection. Intensive Care Soc. 2009;10(1):21–5.

# MIDPALATAL SUTURE MATURATION ASSESSMENT BY INDIVIDUALS WITH DIFFERENT LEVELS OF ACADEMIC DEGREE USING CONE BEAM COMPUTED TOMOGRAPHY

Taiane dos Santos **Lopes**[1], Cinthia de Oliveira **Lisboa**[1], Ilana Oliveira **Christovam**[2], Claudia Trindade **Mattos**[1*]

[1]Department of Orthodontics, School of Dentistry, Fluminense Federal University, Niterói, RJ, Brazil.
[2]Department of Orthodontics, University of Vassouras, Vassouras, RJ, Brazil.

**Palavras-chave**: Tomografia Computadorizada de Feixe Cônico. Palato Duro. Técnica de Expansão Paltina.

**RESUMO**

**Objetivo:** Avaliar a confiabilidade da classificação dos estágios de fusão da sutura palatina mediana em adolescentes do sexo feminino através de tomografia computadorizada cone beam (TCCB) por aluno da graduação em dois tempos (intraexaminador) e comparado a um ortodontista (interexaminador). **Métodos:** Foram selecionadas tomografias de 40 meninas na faixa etária de 14 a 19 anos feitas previamente ao tratamento ortodôntico. No *software* InVivo Dental 5.1 as imagens da cabeça foram orientadas de forma padronizada. Os cortes axiais desejados foram selecionados por um pesquisador ou por cada examinador e cada imagem resultante foi classificada quanto ao estágio de fusão da sutura palatina mediana. Os operadores realizaram todas as classificações duas vezes com intervalo de duas semanas entre as sessões, cada um individualmente. O coeficiente kappa ponderado de acordo com Landis e Kock foi utilizado para avaliar a concordância intraexaminador e interexaminador. **Resultados:** O kappa intraexaminador do aluno da graduação foi de 0,824 pra cortes pré-selecionados e 0,692 para os orientados por ele mesmo, e do ortodontista foi de 0,919 e 0,695, respectivamente. O coeficente kappa entre eles foi 0,479 e 0,300. **Conclusão:** Apesar do aluno de graduação ser mais inexperiente, sua concordância intraexaminador foi muito boa, semelhante à do ortodontista. No entanto, a concordância entre eles não foi boa, demonstrando necessidade de aprimoramento no treinamento do método.

**Keywords**: Cone-Beam Computed Tomography. Hard Palate. Palatal Expansion Technique.

**ABSTRACT**

**Objective:** Our aim was to analyze the reliability of midpalatal suture maturation assessment in females in the final growth period using cone-beam computed tomography (CBCT) by an undergraduate student in two time periods (intra-examiner) and compared to an orthodontist (inter-examiner). **Methods:** Forty pretreatment CBCT images of 14 to 19-year-old females were selected. Images were oriented in the InVivo Dental 5.1 software. Axial slices were selected either by a researcher (preselected slices – suture-PS) or by the examiners (free scanning and slice selection – suture-FS) and each image was classified according to its midpalatal suture maturation stage. The examiners analyzed all images individually and twice, with a two-week interval between sessions. The weighted kappa coefficient according to Landis and Kock was used to assess intra- and inter-examiner agreement. **Results:** The Kappa intra-examiner of the undergraduate student was 0.824 for suture-PS and 0.692 for suture-FS, and the orthodontist was 0.919 and 0.695, respectively. Inter-observer agreement was higher for suture-PS (>0.479) than for suture-FS (>0.300). **Conclusion:** The intra-observer kappa coefficient was very good for the undergraduate student, similar to the orthodontist. However, inter-examiner agreement was not good, indicating a need for development in the method training.

Submitted: December 18, 2019
Modification: January 20, 2020
Accepted: January 24, 2020

***Correspondence to:**
Claudia Trindade Mattos
Address: Rua Mário Santos Braga, 30, 2º andar, sala 214, Campus do Valonguinho, Centro, Niterói, RJ, Brazil. Zip code: 24020-140
Telephone number: + 55 (21) 2622-1621
E-mail: claudiatrindademattos@gmail.com

## INTRODUCTION

Rapid maxillary expansion (RME) is a treatment indicated to increase the transversal dimension of maxilla through the opening of midpalatal suture. This treatment is applied in cases of skeletal atresia[1]. In individuals in the final stages of skeletal maturity, this expansion can be difficult due to closure of midpalatal suture, and can cause accentuated buccal tipping, bony fenestration, gingival recession and alveolar plate resorption.[2-5]

The fusion of the midpalatal suture can extend from infancy until the age of 30 years and is variable between individuals of the same age.[6] The individual evaluation of stages of midpalatal suture maturation before RME may improve diagnosis and contribute to the success of treatments because such evaluation helps determine whether conventional treatments can be implemented or surgically assisted rapid maxillary expansion is necessary.

Angelieri et al.[7] proposed a qualitative method of midpalatal suture maturation classification via cone beam computed tomography (CBCT). This method can improve diagnosis and treatment planning. Midpalatal suture maturation has five stages (A, B, C, D, and E). At stages A, B, and C, the midpalatal suture is still open; at stage D, it closes in the palatine bone; and at stage E, the midpalatal suture is totally closed.

The method proposed by Angelieri et al.[7] should be used by clinical orthodontists because it may be utilized to predict the ideal treatment choice for a successful individual RME. This method should be simple and practical to contribute to treatment planning. Many authors[8-14] analyzed the proposed method,[7] but none of them evaluated the reliability of the assessment of midpalatal suture maturation at different levels of academic degree.

This study aimed to analyze the assessment of midpalatal suture maturation in females in the final growth period via CBCT used by an undergraduate student in two time periods (intra-examiner). Results were compared with those obtained by an orthodontist (inter-examiner).

## MATERIALS AND METHODS

The research protocol was approved by the Ethics and Research Committee from Universidade Federal Fluminense (CAAE #37656014.8.0000.5243). Cone-beam computed tomographies from 14 to 19-year-old females were selected. All CBCT images had been acquired before orthodontic treatment for clinical reasons (in cases which were necessary to improve the diagnosis). CBCTs were obtained with the i-CAT 3D scanner (2.0.2.1 Xoran Technologies, Ann Arbor, Michigan). The images were acquired at 12 bits in a 360 µ rotation by using a 20-s cycle, expanded field of view (220 mm), and voxel size of 0.4 mm. The images were stored in the DICOM format (Digital Imaging and Communications in Medicine).

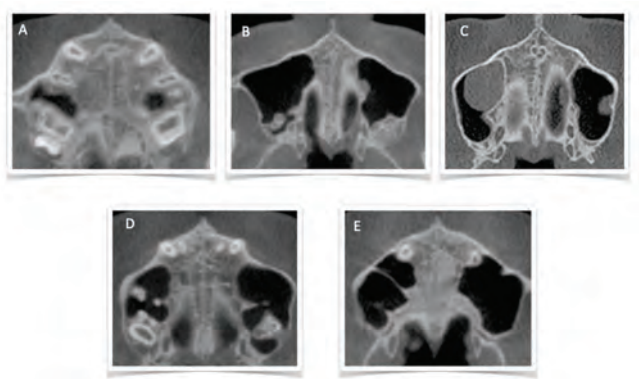


***Figure 1**: The midpalatal suture maturation stages A, B, C, D, and E, according to the method proposed by Angelieri et al.[7]*

All CBCT images were assessed using InVivo Dental 5.1 (Anatomage, San Jose, California). Head orientation was performed in the software in accordance with previously described methods[7] by checking all the planes of space and ensuring that the anteroposterior long axis of the palate was horizontal. The images were later classified into five maturation stages[7]: 1) at stage A, the midpalatal suture was almost a straight high-density sutural line with minimal or no interdigitation; 2) at stage B, the midpalatal suture assumes an irregular shape and appears as a scalloped high-density line; 3) at stage C, it is categorized as "bony islands" throughout the midpalatal suture; 4) at stage D, the midpalatal suture fuses in the palatine bone; and 5) at stage E, the midpalatal suture fuses in the maxilla (Figure 1).

Two observers (TSL and IOC; an undergraduate student and an orthodontist) were trained and calibrated to perform all assessments by using CBCT scans that were not included in this study. The undergraduate student was in the last academic year in dentistry, while the orthodontist had a previous experience in interpreting CBCT images and had already been trained to apply the proposed method. Each examiner was considered calibrated when the weighted kappa coefficients between two time assessments and between his/her classifications and those from their trainer were above 0.5.

They were blinded to the subjects' age and independently performed all assessments twice with a 2-week interval between sessions. The observers conducted the following evaluations: suture assessment in CBCT-predetermined slices (suture-PS) and suture assessment in CBCT through free scanning and slice selection by each observer (suture-FS).

For the suture-PS evaluation, a third researcher (COL)performed the head orientation and selected the axial cross-sectional slice for all patients. The researcher also coded and randomly organized the images in a presentation (Microsoft Office PowerPoint 2007; Microsoft, Redmond, Washington) with a black background, displayed sequentially on a high-definition computer monitor for assessment by the examiners. For suture-FS, the evaluators freely performed head orientation, selected slices, and classified the maturation stages of the midpalatal suture from the images (as described in a previous method)[7].

## Statistical Analysis

A weighted kappa coefficient was used to test the intra-observer and inter-observer agreement for suture-PS and suture-FS. Kappa coefficients were categorized in accordance with the methods of Landis and Kock[15] (poor, 0–0.19; fair, 0.20–0.39; moderate, 0.40–0.59; substantial, 0.60–0.79; and almost perfect, 0.80–1.00).

# RESULTS

Table 1 shows intra- and inter-examiner kappa coefficient agreements for the methods analyzed. The intra-observer agreements were almost perfect for suture-PS for undergraduate student and orthodontist. When evaluators freely performed head orientation, slice selection, and classification of the maturation stages of the midpalatal suture the agreements were substantial for both observers. The inter-examiner weighted kappa coefficient was moderate for suture-PS and poor for suture-FS.

Table 2 shows the student's agreement percentage compared with the orthodontist's assessments of suture-PS and suture-FS. The student's agreement percentages were smaller at stages B and D. The student's disagreement percentages compared with the orthodontist's assessments were mostly from only one stage of difference at these stages (Table 3). For suture-FS, the largest disagreement percentage was detected at stage C, and no important difference was found between one stage or more than of stages of differences between the undergraduate student's assessments compared with the orthodontist's assessments (Table 3).

***Table 1**: Intra- and inter-observer agreement (kappa coefficient).*

| Assessment type | Intra-observer | | Inter-observer |
|---|---|---|---|
| | Student | Orthodontist | Student X Orthodontist |
| Suture-PS | .824 | .919 | .479 |
| Suture-FS | .692 | .695 | .300 |

**Note:** *Suture-PS: suture assessment in CBCT predetermined slices; Suture-FS: suture assessment in CBCT through free scanning and slice selection by the observer.*

***Table 2**: Student's agreement percentual compared to the orthodontist assessments*

| Stage | Student's percent agreement | |
|---|---|---|
| | Suture-PS | Suture-FS |
| A | 50% | 50% |
| B | 40% | 14% |
| C | 57% | 36% |
| D | 25% | 12.5% |
| E | 46.1% | 57% |

**Note:** *Suture-PS: suture assessment in CBCT predetermined slices; Suture-FS: suture assessment in CBCT through free scanning and slice selection by the observer*

***Table 3**: Student's disagreement compared to the orthodontist assessments.*

| Stage | Student's disagreement | | | |
|---|---|---|---|---|
| | Suture-PS | | Suture-FS | |
| | 1 stage | More than 1 stage | 1 stage | More than 1 stage |
| A | 0 | 3 | 0 | 2 |
| B | 6 | 0 | 6 | 0 |
| C | 0 | 3 | 5 | 4 |
| D | 2 | 1 | 5 | 2 |
| E | 2 | 5 | 0 | 3 |
| TOTAL | 10 (45.5%) | 12 (54.5%) | 16 (59%) | 11 (41%) |

**Note:** *Suture-PS: suture assessment in CBCT predetermined slices; Suture-FS: suture assessment in CBCT through free scanning and slice selection by the observer; 1 stage: one stage of difference between the undergraduate student assessment compared to the orthodontist assessments; More than 1 stage: more than one stage of difference between the undergraduate student assessment compared to the orthodontist assessments.*

## DISCUSSION

Rapid maxillary expansion may be complicated in individuals at the end of growth because of skeletal maturation. An individual evaluation of midpalatal suture maturation may improve diagnosis and treatment planning, indicating either conventional or surgical treatment is appropriate. In our study, females aged 14–19 years were assessed because they were at their final growth stages or at the critical stage to achieve the success of RME.

A systematic review[16] found three types of assessments of midpalatal suture maturation: quantitative, semi-quantitative and qualitative evaluations. Angelieri *et al.*[7] proposed a novel qualitative methodology using CBCT for individual evaluation of midpalatal suture maturation. This method should be simple to use in order to be implemented in clinical practice in orthodontics. The method was proposed and validated through a study[7] in which three evaluators, who introduced and proposed the method, tested 30 random CBCTs and the weighted kappa coefficients were calculated.

In some articles,[8,9,11-14] the evaluators who had a previous experience in interpreting CBCT images classified midpalatal suture images. Barbosa et al.[10] assessed the reliability of the individual assessment of midpalatal suture maturation as conducted by orthodontists and radiologists with varied age and experience, and some of them had no experience in CBCT. However, no article has reported midpalatal suture maturation assessment by people without an experience in diagnostic imaging exams or by undergraduate students. In our article, the undergraduate student, who had never used CBCT, underwent training, mastered the use of the method proposed by Angelieri et al.,[7] and categorized the suture at appropriate stages.

The intra-observer agreement for suture-PS was almost perfect between the undergraduate student and the orthodontist. These results were similar to previous findings,[7,8,11-14] which were obtained by observers who had a previous experience in analyzing CBCT images. On the basis of these findings, we might infer that the method proposed by Angelieri et al.[7] might be learned by people who were not familiar with the software and who had never analyzed CBCT images.

Although in a recent article[10] some examiners who had no previous experience with CBCTexams analyzed the midpalatal suture maturation and reached fair to moderate agreement rates other previous articles showed that the undergraduate student has success in analyzing and performing different diagnostic methods using CBCT images. Additionally, in other studies, the group with the lowest level of orthodontic experience had the best performance in analyzing the cervical vertebrae maturation method[17] and undergraduate students showed better volumetric landmark location in 3-dimensional images than orthodontic residents,[18] confirming that the level of experience do not always improve reliability.

The intra-observer weighted kappa coefficients of suture-FS were substantial for both observers. The results were almost identical, so the level of academic degree and prior use of CBCT images did not influence image processing and midpalatal suture classification. The results were lower than those of the method with predetermined slices, showing that the head orientation and the selection of axial cross-sectional slices might hamper method execution by the undergraduate student and the orthodontist.

The training of the method and the calibration of observers in using the software have been used in some studies that analyzed diagnostic methods involving CBCT.[18,19,20] For the qualitative assessment of midpalatal suture maturation, our results might indicate that previous training is essential regardless of the level of academic degree because the method is based on the visual evaluation of straightness, shape, interdigitation, and density of sutural line.

The inter-examiner agreements for suture-PS and suture-FS were moderate and fair, respectively. These results suggested that the observers developed an individual technique and standardized classification performance after they underwent training. However, the method was qualitative and subjective, so differences could be observed in this standardization. As a result, inter-observer agreement was low. Another study[21] proposed an objective and quantitative method of fractal analysis by using a CBCT image to evaluate the maturity of the midpalatal suture. The results revealed an almost perfect intra-examiner agreement (0.84) and a substantial inter-examiner agreement (from 0.67 to 0.72). This method might help enhance the reliability of midpalatal suture stages.

Although the results obtained by the undergraduate student and the orthodontist were similar, we emphasized that the exploration of CBCT in dental schools might improve the utilization of this technology in clinical practice. CBCT has been shown to be an excellent modality for maxillofacial imaging, and numerous applications in the oral and maxillofacial region have been reported[22,23]. The use of 3D CBCT images in oral radiology courses further familiarizes students with 3D anatomy and prepares them to interpret 3D images.[23]

This study was limited by the use of images of only females of a particular age range. Further studies should be conducted to confirm our results by involving different

examiners and using images of different individuals.

The intra-observer kappa coefficients of the undergraduate student and the orthodontist using predetermined slices were almost perfect. This result indicated that people without any related experience could learn and apply the method of midpalatal suture classification. However, the inter-examiner agreements were moderate and fair, indicating that each observer might develop a different assessment method.

## REFERENCES

1. Korbmacher H, Schilling A, Püschel K, Amling M, Kahl-Nieke B. Age-dependent three-dimensional microcomputed tomography analysis of the human midpalatal suture. J Orofac Orthop 2007; 68 (5): 364-76.

2.Fricke-Zech S, Gruber RM, Dullin C, Zapf A, Kramer FJ, Kubein-Meesenburg D, Hahn W. Measurement of the midpalatal suture width. Angle Orthod 2012;82 (1):145-50.

3. Ciambotti C, Ngan P, Durkee M, Kohli K, Kim H. A comparison of dental and dentoalveolar changes between rapid palatal expansion and nickel-titanium palatal expansion appliances. Am J Orthod Dentofacial Orthop 2001; 119:11–21.

4. Handelman CS, Wang L, Begole EA, Haas AJ. Nonsurgical rapid maxillary expansion in adults: Report on 47 cases using the Haas expander. Angle Orthod 2000;70: 129-144.

5. Kilic N, Kiki A, Oktay H. A comparison of dentoalveolar inclination treated by two palatal expanders. Eur J Orthod 2008; 30:67-72.

6. Knaup B, Yildizhan F, Wehrbein H. Age-related changes in the midpalatal suture. A histomorphometric study. J Orofac Orthop 2004,65 (6), 467-74.

7. Angelieri F, Cevidanes LH, Franchi L, Gonçalves JR, Benavides E, McNamara JA. Midpalatal suture maturation: classification method for individual assessment before rapid maxillary expansion. Am J Orthod Dentofacial Orthop 2013;144 (5): 759-69.

8. Tonello DL, Ladewig VM, Guedes FP, Ferreira Conti ACC, Almeida-Pedrin RR, Capelozza-Filho L. Midpalatal suture maturation in 11- to 15-year-olds: A cone-beam computed tomographic study. Am J Orthod Dentofacial Orthop. 2017; 152(1):42-48.

9. Angelieri F, Franchi L, Cevidanes LH, McNamara JA Jr. Diagnostic performance of skeletal maturity for the assessment of midpalatal suture maturation. Am J Orthod Dentofacial Orthop 2015; 148:1010-101610.

10. Barbosa NMV, Castro AC. Conti F, Capelozza-Filho L, Almeida-Pedrin RR, Cardoso MA. Reliability and reproducibility of the method of assessment of midpalatal suture maturation: A tomographic study. Angle Orthod 2019; 89:71–77

11. Isfeld D, Flores-Mir C, Leon-Salazar V, 2019, Lagravere M. Evaluation of a novel palatal suture maturation classification as assessed by cone-beam computed tomography imaging of a pre- and postexpansion treatment cohort. Angle Orthod. 2019; 89:252–261.

12. Sayar G, Kilinç DD. Rapid maxillary expansion outcomes according to midpalatal suture maturation levels. Prog Orthod 2019; 20:27.

13. Jimenez-Valdivia LM, Malpartida-Carrillo V, Rodríguez-Cárdenas YA, Dias-Da Silveira HL, Arriola-Guillén LE. Midpalatal suture maturation stage assessment in adolescents and young adults using cone-beam computed tomography. Prog in Orthod 2019; 20:38.

14. Ladewig VM, Capelozza-Filho L, Almeida-Pedrin RR, Guedes FP, Cardoso MA, Ferreira Conti ACC. Tomographic evaluation of the maturation stage of the midpalatal suture in postadolescents. Am J Orthod Dentofacial Orthop 2018;153:818-24

15. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics 1977; 33:159-174.

16. Isfeld D, Lagravere M, Leon-Salazar V, Flores-Mir C. Novel methodologies and technologies to assess mid-palatal suture maturation: a systematic review. Head Face Med. 2017;13:13.

17. Rongo R, Valleta R, Bucci R, Bonetti GA, Michelotti A, D'Antò V. Does clinical experience affect the reproducibility of cervical vertebrae maturation method? Angle Orthod 2015; 085: 841-847.

18. Miguez-Contreras M, Jimenez-Trujillo I, Romero-Maroto M, López-de-Andrés A, Lagravère MO. Cephalometric landmark identification consistency between undergraduate dental students and orthodontic residents in 3-dimensional rendered cone-beam computed tomography images: A preliminary study. Am J Orthod Dentofacial Orthop 2017;151:157-166.

19. Neiva MB, Soares AC, Lisboa CO, Vilella OV, Motta AT. Evaluation of cephalometric landmark identification on CBCT multiplanar and 3D reconstructions. Angle Orthod. 2015;85(1):11-7.

20. Engel TP, Renkema AM, Katsaros C, Pazera P, Pandis N, Fudalej PS. The cervical vertebrae maturation (CVM) method cannot predict craniofacial growth in girls with Class II malocclusion. Eur J Orthod 2016;38(1):1-7.

21. Kwak KH, Kim SS, Kim YI, Kim YD. Quantitative evaluation of midpalatal suture maturation via fractal analysis. Korean J Orthod. 2016; 46:323–330.

22. Parashar V, Whaites E, Monsour P, Chaudhry J, Geist JR. Cone beam computed tomography in dental education: A survey of U.S., U.K., and Australian dental school. J Dent Educ 2012; 76(11):1443-1447.

23. De Vos W, Casselman J, Swennen GR. Cone-beam computerized tomography (CBCT) imaging of the oral and maxillofacial region: a systematic review of the literature. Int J Oral Maxillofac Surg 2009; 38:609-25.

# DENTAL CARIES EXPERIENCE ASSOCIATE WITH MENTAL ISSUES AND HYPERTENSION IN ASIAN AMERICANS

Yilan **Miao**[1], Alexandre R. **Vieira**[1*]

[1]Department of Oral Biology, School of Dental Medicine, University of Pittsburgh, Pittsburgh, PA, USA.

**Palavras-chave:** Asiáticos. Americanos asiáticos. Status dental. Cárie. Periodontite.

**RESUMO**

**Objetivo:** Determinar se medidas de saúde oral (cárie dentária e periodontite) estão associadas com doenças cardiovasculares e mentais em asiáticos americanos. **Métodos:** Dados de saúde, experiência de cárie (CPOD e CPOS) e periodontitie de asiáticos americanos foram obtidos do Registro Odontológico e Repositório de DNA da Universidade de Pittsburgh. O total de 6.117 pessoas estava disponível no registro e 309 asiáticos americanos foram estudados (292 adultos e 17 crianças abaixo de 12 anos). As frequências de doença mental e hipertensão, dependendo da experiência de cárie e periodontite, foram avaliadas e os testes qui-quadrado e exato de Fisher foram usados com alfa de 0,05 para determinar diferenças estatísticas. **Resultados:** A média de CPOD dos 292 adultos foi de 10,1 e a média de CPOS foi 27,5, o que é parecido com os valores esperados de CPOD de adultos nos Estados Unidos (9,0-11,3). A média de CPOD das 17 crianças menores de 12 anos foi 1,8 e a do CPOS foi 3,8, o que também é similar aos valores de CPOD em crianças dos Estaods Unidos (1,2-2,6). Experiência de cárie mais severa associou-se com ter problema de saúde mental (p=0,02) e hipertensão (p=0,02). Não se encontrou associação entre periodontite e problemas mentais ou cardiovasculares na amostra. **Conclusão:** Experiência de cárie mais severa em asiáticos americanos associa-se com doença mental e cardiovascular.

**Keywords:** Asians. Asian Americans. Dental Status. Caries. Periodontitis.

**ABSTRACT**

**Objective:** To determine if oral health indicators (dental caries experience and periodontitis) associate with mental and cardiovascular health issues in Asian Americans. **Methods:** Medical history data, dental caries experience (DMFT and DMFS; Decayed, Missing due to caries, Filled Teeth/Surface), and periodontitis status of Asian Americans were obtained from the Dental Registry and DNA Repository at University of Pittsburgh School of Dental Medicine. A total of 6,117 individuals were evaluated and among which dental status of 309 Asian American subjects (292 adults and 17 children under the age of twelve) were analyzed. The frequency of mental health issues and hypertension depending on dental caries experience (Decayed, Missing due to caries, Filled Teeth or Surfaces, DMFT/DMFS) and periodontitis were evaluated and chi-square or Fisher's exact test were used with an alpha of 0.05 to determine statistical differences. **Results:** For the 292 Asian American adult subjects, the mean DMFT was 10.1 and mean DMFS was 27.5, which is similar to the expected values in adult DMFT (9.0-11.3) for the United States. For the 17 Asian American children subjects under age of twelve, the mean DMFT was 1.8 and mean DMFS was 3.8, which also fell into the expected values for children DMFT for the United States (1.2-2.6). More severe dental caries experience was associated with having an underlying mental health issue (p=0.02) and hypertension (p=0.02). No associations between having periodontitis and mental or cardiovascular issues were found in the cohort. **Conclusion:** More severe dental caries experience of Asian Americans associate with mental and cardiovascular issues.

Submitted: September 2, 2019
Modification: November 11, 2019
Accepted: December 3, 2019

***Correspondence to:**
Alexandre R. Vieira
Address: Department of Oral Biology, 412 Salk Pavilion, School of Dental Medicine, University of Pittsburgh, 335 Sutherland Street, Pittsburgh, PA, USA 15261.
Telephone number: +1 (412) 383-8972
Email: arv11@pitt.edu

## INTRODUCTION

Asian Americans are the third most significant minority ethnic group in the United States, after African Americans and Hispanic Americans. However, most Asian Americans in the US have arrived after the passage of the 1965 Immigration and Nationality Act, which has ended the exclusion of Asian immigrants.[1] Since then, the Asian American population has increased from 491,000 in 1960 to 22,408,646 in 2017, representing a 4564% increase.[2] This makes Asian Americans 6.9% of the US population and they are generally less studied then their White US counterparts.

Associations between oral health issues such as caries and periodontitis and overall health problems such as mental and cardiovascular risks are likely to involve and relate to inflammation. Individuals with mental health disorders have difficulties with oral hygiene, self-care, and higher frequency of other comorbidities. Poor mental health has been associated with dental caries, periodontitis, dry mouth, behavioral changes, comorbid physical disease, smoking, alcohol and substance abuse, and susceptibility to oral infection.[3-9] Similarly, cardiovascular diseases and diabetes associate with worse oral health indicators.[10,11] However, data are scarce regarding the impact on oral health of comorbidities of Asian Americans[12,13] and the aim of this study was to determine if mental and cardiovascular issues associated with worse oral health indicators in Asian Americans.

## MATERIALS AND METHODS

The clinical information of Asian-American patients was obtained from the Dental Registry and DNA Repository (DRDR) project at University of Pittsburgh School of Dental Medicine (IRB approval # 0606091). Most patients seeking treatment are from the great Pittsburgh area, and the subjects represent well the ethnic groups of the city and its surroundings. Starting in September of 2006, all individuals who sought treatment at University of Pittsburgh School of Dental Medicine were invited to be part of the registry. Medical history data, caries experience (DMFT and DMFS; Decayed, Missing due to caries, Filled Teeth/Surface), and periodontitis status of Asian Americans were obtained by full mouth probing. Self-reported mental health status (depression and psychiatric disorders) and cardiovascular risks (high blood pressure were computed. Dental assessments were done by students under the supervision of faculty. By the time of this project, a total of 6,117 individuals (recruited between 2006 and 2018) were evaluated and among which dental status of 309 Asian American subjects (292 adults and 17 children under the age of twelve) were analyzed for this study. In this study, the origin of "Asian Americans" refer to the whole continent of Asian, including western Asia countries such as Saudi Arabia, Turkey, and Israel. Individuals self-report their geographic origin. To analyze dental caries experience, individuals were defined as having high caries experience (DMFT $\geq$ 10 or DMFS 28) and low caries experience (DMFT <10 or DMFS < 28). All other variables were defined as having or not the condition. Chi-square or Fisher's exact tests were used for all comparisons with alpha of 0.05.

## RESULTS

Among the Asian American subjects, teenagers and adults had a mean DMFT of 10.1 and DMFS of 27.5 (Table 1), and mean age of 32.59 years (ranging from 13 to 78), with 55% female. These data fall into the range reported to the World Health organization (WHO) for the United States,[14] which has DMFT 9.0—13.9. Asia for the most part has lower reported DMFT (Table 1). For the children included in this study, the mean DMFT was 1.8, and the correlated DMFS was 3.8, with mean age 8.13 years (ranging from 4 to 12) and nine females. These data fall into the mean DMFT range reported to WHO for children in the United States (1.2—2.6).[14]

***Table 1:*** *Dental Caries Experience of Asian American subjects and populations from selected countries in North America and Asia (from Petersen[14]).*

| | DMFT (teenagers and adults) | DMFT (12-year old, only four children contributed to the value) |
|---|---|---|
| **Asian Americans** | 10.1 | 1.8 |
| **WHO region/country** | | |
| **North America** | | |
| USA | 9.0-13.9 | 1.2-2.6 |
| Canada | >13.9 | 1.2-2.6 |
| **Asia** | | |
| China | <5.0 | <1.2 |
| India | 5.0-8.9 | 1.2-2.6 |
| Japan | 9.0-13.9 | 1.2-2.6 |
| North Korea | <5.0 | 2.7-4.4 |
| South Korea | 9.0-13.9 | 2.7-4.4 |
| Mongolia | 9.0-13.9 | 1.2-2.6 |
| Vietnam | 5.0-8.9 | 1.2-2.6 |
| Thailand | 5.0-8.9 | 1.2-2.6 |
| Singapore | 9.0-13.9 | <1.2 |
| Philippines | >13.9 | >4.4 |
| Sri Lanka | 9.0-13.9 | 1.2-2.6 |
| Malaysia | 9.0-13.9 | 1.2-2.6 |
| Indonesia | 5.0-8.9 | 1.2-2.6 |
| Nepal | <5.0 | <1.2 |
| Pakistan | <5.0 | <1.2 |
| Afghanistan | 5.0-8.9 | 2.7-4.4 |
| Kazakhstan | 5.0-8.9 | 1.2-2.6 |
| Iran | 9.0-13.9 | 1.2-2.6 |
| Iraq | 5.0-8.9 | 1.2-2.6 |
| Saudi Arabia | 5.0-8.9 | 1.2-2.6 |
| United Arab Emirates | 5.0-8.9 | 1.2-2.6 |
| Yemen | 5.0-8.9 | 2.7-4.4 |
| Israel | 9.0-13.9 | 1.2-2.6 |
| Syria | 9.0-13.9 | 1.2-2.6 |

*The frequency of periodontitis, mental diseases (depression, anxiety, or psychiatric disorders), diabetes, hypertension, and cardiovascular diseases (atherosclerosis, stroke, or heart attack) is shown in Table 2. Adults with mental disorders were less likely to be caries free (Table 3). Individuals with hypertension were also less likely to be caries free (Table 4). Those differences were not seen for cardiovascular diseases, and periodontitis (Table 5-8).*

***Table 2:*** *Other clinical systemic diseases associated with Asian American subjects.*

| | Periodontal Diseases | Mental Diseases | Diabetes | Hypertension | Cardiovascular Diseases |
|---|---|---|---|---|---|
| **Total** | 124 | 17 | 6 | 18 | 8 |
| **Children** | 5 | 4 | 0 | 0 | 0 |
| **Adults** | 119 | 13 | 6 | 18 | 8 |

***Table 3:*** *Dental caries experience (DMFT/DMFS) in adults with self-reported mental.*

| Adults | | Dental Caries Experience | | |
|---|---|---|---|---|
| | | **High** | **Low** | |
| **Mental Diseases** | **Yes** | 9 | 2 | *p*=0.02 |
| | **No** | 92 | 107 | |

***Table 4:*** *Dental caries experience (DMFT/DMFS) in adults with hypertension.*

| Adults | | Dental Caries Experience | | |
|---|---|---|---|---|
| | | **High** | **Low** | |
| **Hypertension** | **Yes** | 11 | 3 | *p*=0.02 |
| | **No** | 90 | 106 | |

***Table 5:*** *Dental caries experience (DMFT/DMFS) in adults with cardiovascular diseases.*

| Adults | | Dental Caries Experience | | |
|---|---|---|---|---|
| | | **High** | **Low** | |
| **Cardiovascular Diseases** | **Yes** | 4 | 2 | *p*=0.29 |
| | **No** | 96 | 119 | |

***Table 6:*** *Periodontitis in adults with mental diseases.*

| Adults | | Periodontitis | | |
|---|---|---|---|---|
| | | **Yes** | **No** | |
| **Mental Diseases** | **Yes** | 6 | 7 | *p*=0.68 |
| | **No** | 113 | 166 | |

***Table 7:*** *Periodontitis in adults with hypertension.*

| Adults | | Periodontitis | | |
|---|---|---|---|---|
| | | **Yes** | **No** | |
| **Hypertension** | **Yes** | 9 | 9 | *p*=0.41 |
| | **No** | 110 | 164 | |

***Table 8:*** *Periodontitis in adults with cardiovascular diseases.*

| Adults | | Periodontitis | | |
|---|---|---|---|---|
| | | **Yes** | **No** | |
| **Cardiovascular Diseases** | **Yes** | 4 | 4 | *p*=0.23 |
| | **No** | 115 | 177 | |

## DISCUSSION

There are two interesting observations from these data. First, it is apparent that caries experience of Asian individuals in the Pittsburgh area is worse than the reported national data obtained from Asian countries through the World Health Organization. One could expect that the conditions in the United States would permit an improvement in oral health outcomes. There is a number of possibilities that may explain this finding, including national data of Asian countries underestimates the real prevalence of the disease or the caries experience in Pittsburgh is overall worse than other parts of the United States. The US has greater sugar consumption (amount, frequency of intake, types) in general compared to developing countries in Asia. Besides, Pittsburgh is the largest city in the poorest area in the country, the Appalachian mountains. Although Pittsburgh has had fluoridated water since 1953, nearly half of the children in Pittsburgh between six and eight had cavities according to the 2002 State Department of Health report.[15] More than 70% of fifteen-year-old teenagers have had cavities, and about 30% children at Pittsburgh have untreated cavities.

Individuals caries free were less likely to have underlying mental disorders or hypertension. Underlying mechanisms explaining this may include good oral hygiene and dietary habits, and less prominent inflammatory responses. These findings agree with published data that show individuals with mental health issues have more dental caries[9,16-18] and individuals with hypertension have more tooth loss.[19,20]

In comparison to our published data on the project that include Whites and Blacks, the Asian Americans have slightly lower caries experience.[21,22] Our study has the typical limitations of a cohort study that rely on medical records. Records are filled by multiple professionals and there is a chance information is recorded with differences. Overall health status was self-reported. Also, some of our comparisons included a small number of observations.

In summary, Native Asians national caries experience data reported to the World Health Organisation appears to suggest Asian American immigrants in the Pittsburgh area have the same and some instances worse dental caries experience. Asian Americans with underlying mental health issues or hypertension are less likely to be caries free or low caries experience.

### Acknowledgements

The Dental Registry and DNA Repository is supported by the University of Pittsburgh School of Dental Medicine. Y.M. was supported by the Biomedical Master's Program, University of Pittsburgh School of Medicine.

## REFERENCES

1. National Academies of Sciences, Engineering, and Medicine. 2015. The integration of immigrants into American society. Washington D.C.: The National Academy Press. https://doi.org/10.17226/21746.

2. López G, Ruiz NG, Patten E. 2017. Key facts about Asian Americans, a diverse and growing population. Factank. News in the numbers. Pew Research Center. https://www.pewresearch.org/fact-tank/2017/09/08/key-facts-about-asian-americans/

3. Cooper-Kazaz R, Levy DH, Zini A, Sgan-Cohen HD. Severity of psychiatric disorders and dental health among psychiatric outpatients in Jerusalem, Israel. Isr J Psychiatry Relat Sci. 2015;52(2):119-120.

4. Heaton LJ, Swigart K, McNelis, G, Milgrom P, Downing DF. Oral health in patients taking psychotropic medications: results from a pharmacy-based pilot study. J Amer Pharmacists Assoc. 2016; 56(4), 412–417.e1. http://doi.org/10.1016/j.japh.2016.03.009

5. Kisely S, Baghaie H, Lalloo R, Johnson NW. Association between poor oral health and eating disorders: systematic review and meta-analysis. Br J Psychiatry. 2015 Oct;207(4):299-305. doi: 10.1192/bjp.bp.114.156323.

6. Kisely S, Baghaie H, Lalloo R, Siskind D, Johnson NW. A systematic review and meta-analysis of the association between poor oral health and severe mental illness. Psychosom Med. 2015 Jan;77(1):83-92. doi: 10.1097/PSY.0000000000000135.

7. Kisely S, Sawyer E, Siskind D, Lalloo R. The oral health of people with anxiety and depressive disorders - a systematic review and meta-analysis. J Affect Disord. 2016 Aug;200:119-132. doi: 10.1016/j.jad.2016.04.040.

8. Kisely S. No Mental Health without Oral Health. Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie. 2016;61(5), 277–282. http://doi.org/10.1177/0706743716632523

9. Latif T, Vieira AR. Oral health of individuals with mental health disorders. Rio de Janeiro Dent J 2018;3(2):19-25.

10. Holmlund A, Lampa E, Lind L. Oral health and cardiovascular disease in a cohort of periodontitis patients. Atherosclerosis 2017;262:101-106.

11. Dar-Odeh N, Borzangy S, Babkair H, Farghal L, Shahin G, Fadhlalmawla S, Alhazmi W, Taher S, Abu-Hammad O. Association of dental caries, retained roots, and missing teeth with physical status, diabetes mellitus and hypertension in women of the reproductive age. Int J Environ Res Public Health 2019; 16(14):E2565. doi: 10.3390/ijerph16142565.

12. Shiboski CH, Gansky SA, Ramos-Gomez F, Ngo L, Isman R, Pollick HF. The association of early childhood caries and race/ethnicity among California preschool children. J Public Health Dent 2003; 63(1):38-46.

13. Chinn CH, Cruz GD, Chan A. Caries experience among Chinese-American children in Manhattan Chinatown. N Y State Dent J. 2011 Jun-Jul;77(4):43-7.

14. Petersen PE. The world oral health report 2003: continuous improvement of oral health in the 21st century—the approach of the WHO global health programme. Geneva:
World Health Organization, 2003: 10-33.
15. Status of Oral Health in Pennsylvania. PA Department of Health: Harrisburg, PA, USA, 2002: 51.
16. Kisely S, Baghaie H, Lalloo R, Siskind D, Johnson NW. A systematic review and meta-analysis of the association between poor oral health and severe mental illness. Psychosom Med. 2015 Jan;77(1):83-92. doi: 10.1097/ PSY.0000000000000135.
17. Kisely S, Sawyer E, Siskind D, Lalloo R. The oral health of people with anxiety and depressive disorders - a systematic review and meta-analysis. J Affect Disord. 2016 Aug;200:119- 132. doi: 10.1016/j.jad.2016.04.040.
18. Kisely S. No Mental Health without Oral Health. Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie. 2016;61(5):277–282. http://doi.org/10.1177/0706743716632523
19. Vieira AR, Hilands KM, Braun TW. Saving more teeth – A case for personalized care. J Pers Med. 2015;:30-35. doi:10.3390/ jpm5010030.
20. Dar-Odeh N, Borzangy S, Babkair H, Farghal L, Shahin G, Fadhlalmawla S, Alhazmi W, Taher S, Abu-Hammad O. Association of dental caries, retained roots, and missing teeth with physical status, diabetes mellitus and hypertension in women of the reproductive age. Int J Environ Res Public Health. 2019 Jul 18;16(14):E2565. doi:10.3390/ijerph16142565.
21. Küchler EC, Deeley K, Ho B, Linkowski S, Meyer C, Noel J, Kouzbari MZ, Bezamat M, Granjeiro JM, Antunes LS, Antunes LA, de Abreu FV, Costa MC, Tannure PN, Seymen F, Koruyucu M, Patir A, Mereb JC, Poletta FA, Castilla EE, Orioli IM, Marazita ML, Vieira AR. Genetic mapping of high caries experience on human chromosome 13. BMC Med Genet. 2013 Nov 5;14:116. doi: 10.1186/1471-2350-14-116.
22. Küchler EC, Feng P, Deeley K, Fitzgerald CA, Meyer C, Gorbunov A, Bezamat M, Reis MF, Noel J, Kouzbari MZ, Granjeiro JM, Antunes LS, Antunes LA, de Abreu FV, Costa MC, Tannure PN, Seymen F, Koruyucu M, Patir A, Vieira AR. Fine mapping of locus Xq25.1-27-2 for a low caries experience phenotype. Arch Oral Biol. 2014 May;59(5):479-86. doi: 10.1016/j.archoralbio.2014.02.009.

# PERCEPTION ON THE QUALITY OF LIFE RELATED TO ORAL HEALTH IN PRESCHOOL CHILDREN

Ana Carolina Del-Sarto Azevedo **Maia**[1], Harvey Keitel Joviniano **Silva**[1], Matheus Melo **Pithon**[1], Raildo da Silva **Coqueiro**[1]

[1]Dentistry College, Southwest Bahia State University UESB, Jequié, Bahia, Brazil.

**Palavras-chave:** Qualidade de Vida. Cárie Dentária. Traumatismos Dentários. Pré-Escolares.

**RESUMO**

**Introdução:** Avaliar a qualidade de vida relacionada a saúde bucal é de suma importância, visto que são escassos os estudos que avaliam a QVRSB (Qualidade de vida relacionada a saúde bucal) em crianças de 5 e 6 anos. Este estudo teve como objetivo avaliar o impacto da doença cárie e das lesões dentárias traumáticas (TDI) na qualidade de vida relacionada à saúde bucal (QVRSB) em crianças de 5 e 6 anos de idade de acordo com o autorrelatoe o relato secundário dos pais, assim como averiguar a concordância entre eles. **Métodos:** Estudo transversal, realizado com 238 crianças e seus responsáveis atendidos em unidades de saúde e escolas da rede pública do município de Jequié (BA), Brazil. Após a entrevista, as crianças foram submetidas a exame clínico oral para investigar a presença ou ausência de experiência de cárie e IDT. Para a coleta de dados foram usados a Scale of Oral Health Outcomes for 5-year-old children (B-SOHO-5) e um questionário sóciodemográfico. As diferenças nos escores de QVRSB entre as características sociodemográficas e clínicas foram comparadas por meio dos testes Mann-Whitney e Kruskal-Wallis. Comparou-se a concordância das respostas entre crianças e pais por meio da estatística Kappa (≥ 0,60). A diferença entre os escores totais das crianças e dos pais foi examinada com o teste de Wilcoxon; o coeficiente de concordância de Lin e o método de Bland e Altman foram usados como medidas de concordância. Foi adotado nível de significância de 5% ($\alpha$ = 0,05). **Resultados:** Houve associação significativa (p≤ 0,05) entre a cárie e a TDI de acordo a percepção das crianças. Ocorreu discordância/pobre concordância significativa entre os relatos dos pares criança-pai e criança-mãe com relação à QVRSB da criança. **Conclusão:** A doença cárie e as TDI causam impacto negativo na QVRSB de acordo com a percepção apenas das crianças. A pesquisa apontou que os pais não são fontes confiáveis para avaliar a saúde bucal do seu filho.

**Keywords:** Quality of Life. Dental Cavity. Tooth Injuries. Preschool.

**ABSTRACT**

**Introduction:** To evaluate the quality of life related to oral health is of paramount importance, since there are few studies evaluating the OHRQoL (Oral health related quality of life) in children of 5 and 6 years. This study aimed to evaluate the impact of caries disease and traumatic dental injuries (TDI) on oral health related quality of life (OHRQoL) in children of 5 and 6 years of age according to the self report and the secondary report of the parents, as well as ascertain the agreement between them. **Methods:** A cross-sectional study with 238 children and their caregivers attended at health units and public schools in the municipality of Jequié (BA), Brazil. After an interview, the children were submitted to oral clinical examination to investigate the presence or absence of caries experience and TDI. For data collection, the Scale of Oral Health Outcomes for 5-year-old children (B-SOHO-5) and a sociodemographic questionnaire were used. Differences in OHRQoL scores between sociodemographic and clinical characteristics were compared using the Mann-Whitney and Kruskal-Wallis tests. The agreement of the responses between children and parents was compared using Kappa statistics (≥ 0.60). The difference between the total scores of the children and the parents was examined with the Wilcoxon test; the Lin coefficient of agreement and the Bland and Altman method were used as measures of agreement. A significance level of 5% ($\alpha$ = 0.05) was adopted. **Results:** There was a significant association (p≤ 0.05) between caries and TDI with OHRQoL according to the children's perception. There was significant mismatch / mismatch between the reports of the child-father and the mother-child pairs in relation to the child's OHRQoL. **Conclusion:** Caries disease and TDIs have a negative impact on OHRQoL according to the perception of only the children. Research has pointed out that parents are not reliable sources for assessing their child's OHRQoL.

Submitted: September 11, 2019
Modification: October 8, 2019
Accepted: October 9, 2019

***Correspondence to:**
Matheus Melo Pithon
Address: Av. Otávio Santos, 395, sala 705, Centro, Vitória da Conquista, BA, Brazil.
Zip code: 45020-750
E-mail: matheuspithon@gmail.com

# INTRODUCTION

The dental health problems that most affect the child population are caries disease and traumatic dental injuries (TDI),[1] both in developed and developing countries.[2,3] Caries disease and complicated LDL have a negative impact on oral health-related quality of life in both pre-school children, 2-5 years of age and in their parents.[4-6] When untreated, tooth decay brings discomfort, toothache, as well as affects the child's weight and growth,[7,8] as well as affect self-esteem due to aesthetic compromise, generating isolation from social interaction, however , these evidences are based on secondary reports of the parents.[9]

Several instruments that evaluate oral health-related quality of life (OHRQOL) have been used for children over six years of age,[10,11] while for children of lower age there are few studies.[12,13] Recently, the Scale of Oral Health Outcomes for 5-year-old children (B-SOHO-5)[14] was developed with the objective of measuring the OHRQOL of 5-year-old children through self reports and secondary reports from parents. This is of the utmost importance since both parties are heard, a fact which was not observed in studies prior to the creation of the aforementioned instrument. The perception about the OHRQoL of children in this age group was provided only from the perspective of the parents.

Thus, due to the scarcity of studies about the perception of OHRQoL in children aged 5 to 6 years, this study aims to evaluate the impact of caries and TDI on children's OHRQoL, based on the perception of parents and the child as well as to evaluate the concordance between reports of parents and children.

# MATERIALS AND METHODS

This study was approved by the Research Ethics Committee of the State University of Southwest of Bahia, CAAE: 28543714.6.0000.0055. Therefore, the Informed Consent Form (TCLE) and Term of Assent were made available to parents / guardians and children, who agreed to participate in the research.

## Study participants

The present cross-sectional study included 238 children, and their caregivers, attended at health units and public schools in the municipality of Jequié (BA), Brazil together with their parents or guardians. The inclusion criteria were: children of both sexes, with complete deciduous dentition, without systemic or neurological impairment, who resided with the parents/guardians. Those children who underwent dental treatment in the last three months were excluded and children who presented absence of any deciduous dental element due to agenesis, trauma or extraction.

## Data collection

Data collection was performed using the B-SOHO-5, which consists of a self-reported version of the child and another of the parents' secondary reports regarding the child's OHRQoL. The instrument consists of 14 items contained in the two versions, 07 items for each, and 06 of these are common in terms of content in both versions. The items in the children's questionnaire are: difficulty eating, difficulty drinking, difficulty speaking, difficulty to play, difficulty sleeping, avoid smiling due to pain and avoid smiling because of the appearance. The answers of each item were given on a 3-point scale: no = 0; a little = 1; very = 2. The children were assisted by cards with three-sided pictures to help them explain the answers. In the parents version the question "self-confidence of the child affected by the teeth" was replaced by the item "difficulty to drink" present in the version of the children, in addition the other items were similar. The responses of the parents' version were categorized in a Likert scale of 5 points (not at all = 0, a little = 1, more or less = 2, quite = 3, a lot = 4), then regrouped in 3 point answers (not at all = 0, a little / more or less = 1, a lot / a lot = 2) so that it could compare with the children's version scores.

The total score for each of the B-SOHO-5 versions was calculated from the sum of the points in the response options. Thus, the total score varied from 0 to 12, since to analyze the agreement was considered only the 6 similar questions in both versions. Regarding the interpretation of the scale, higher scores indicate a worse quality of life of the child. Respondents answered a second questionnaire with socioeconomic information containing family income, age of the child, gender of the child and parents.

The data collection procedure was based on the criteria of Alvarez,[9] the child and his / her guardian, preferably the one who spent the longest time with it, answered the Brazilian version of B-SOHO-5 through independent interviews to prevent interference in the parties' responses.

After an interview, the children were submitted to oral clinical examination by two previously calibrated examiners (Kappa intra and inter-examiner 0.88 and 0.82, respectively) to investigate the presence or absence of caries experience and TDI. The data on dental caries were tabulated according to the ceo-d index, and categorized according to severity using World Health Organization criteria (1997), with ceo-d 0 = no

caries experience; ceo-d 1-5 = low caries experience and ceo-d > 6 = high caries experience. The evaluation of the trauma was made by clinical examination and by questioning to those responsible. TDIs were categorized into present and absent.

### Statistical procedure

For the descriptive analysis of the sample characteristics, the absolute and relative frequencies, averages and standard deviations were calculated. Differences in OHRQoL scores between sociodemographic and clinical characteristics were compared using the Mann-Whitney and Kruskal-Wallis tests. The agreement of the responses between children and parents for each item of the OHRQoL scale was compared using Kappa statistics, and a Kappa value > 0.60 was adopted as clinically acceptable.[15] The difference between the total scores of the children and the parents was examined with the Wilcoxon test; the Lin coefficient of agreement and the Bland and Altman method were used as measures of agreement, and a coefficient of agreement of Lin > 0.94 was considered as clinically acceptable.[16] In all analyzes, the level of significance was 5% ($\alpha = 0.05$). The data were analyzed in IBM SPSS Statistics for Windows (IBM SPSS, 21.0, 2012, Armonk, NY: IBM Corp.) and MedCalc version 9.1.0.1 (2006, Mariakerke, Belgium).

## RESULTS

### Sample characteristics

Table 1 shows the sociodemographic and clinical data of the study participants. Most of the children were in the five-year-old male group. There was a much greater participation of the mothers than of the fathers, and the great majority reported a family income lower than a minimum wage. Clinical examinations indicated that more than 70% of the children had experience of caries, with low experience being predominant. TDIs were frequent in approximately two out of 10 children evaluated.

Figure 1 shows the total scores and of each item for the OHRQoL scale, according to the child's own perception (Figure 1A) and his parents (Figure 1B). The items that were difficult to eat and difficult to play were those with the highest and lowest scores, respectively, both in the evaluation of the children and in the evaluation of the parents. In general, the total OHRQoL score was 46% higher in the evaluation of the children in relation to the parents' evaluation.

### Impact of socio-demographic and clinical characteristics on oral health-related quality of life

There were no associations (p> 0.05) of the child's sex and family income with the OHRQoL, according to the child's perception. However, the items difficulty speaking and difficulty to play had significantly higher scores in the group of older children (6 years). Significant negative impact of caries disease was observed in the OHRQoL, and for all items, as well as for the total result, higher scores were observed in the group with high caries experience; in addition, the group with low caries experience also presented higher scores than the group with no caries experience for difficulty speaking and total outcome. The presence of TDI had a negative impact on OHRQoL in the items difficulty in eating, difficulty in drinking, difficulty in playing, as well as in the total result (Table 2).

For the parents' perception, there were no associations (p > 0.05) of the OHRQoL with child's age, child's sex, family income, dental caries and TDI. However, there was an association between the OHRQoL and the parents 'gender, and the mothers' evaluation resulted in statistically higher scores for items difficult to eat, difficulty speaking, difficulty sleeping, no smile due to caries or pain, self-esteem and total outcome (Table 3).

Agreement between the perception of children and parents on quality of life related to oral health

The frequency of responses to the OHRQoL scale, according to the corresponding categories for the child-father and the parent child, are shown in Tables 4 and 5. The Kappa statistic (-0.002- 0.19) (for items that were possible to calculate) indicated that there was disagreement in practically all items evaluated, except for the difficulty to talk and stopped smiling because of caries or pain in the mother-child pair, who presented poor agreement.

Table 6 shows the comparisons and the coefficients of agreement of the total OHRQoL scores between the child-father and the mother-child pairs. The OHRQoL scores were significantly different between the children and the parents, with the scores of the children being larger, regardless of the gender of the parents. The Lin coefficients showed disagreement for the child-father pair and poor agreement for the parent-child pair. The Bland-Altman chart confirmed the disagreement / poor agreement between the children's and parents 'perceptions, indicating a significant bias between the children's scores and the parents' scores, with the bias being higher in the parent-child pair.

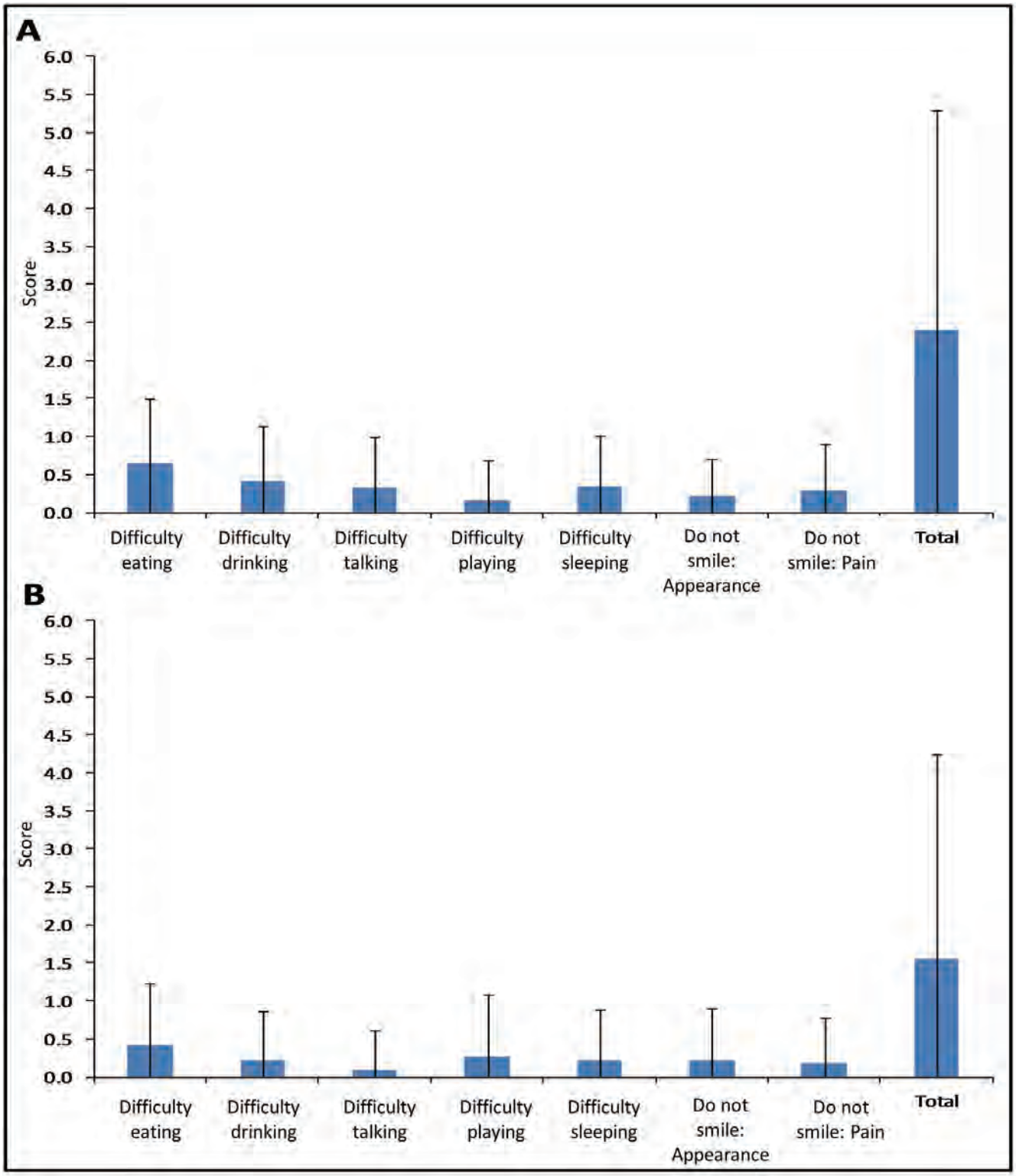


***Figure 1:*** *Quality of life score related to oral health, according to the perception of the child (A) and the parents (B). The columns represent the means and the error bars the standard deviations.*

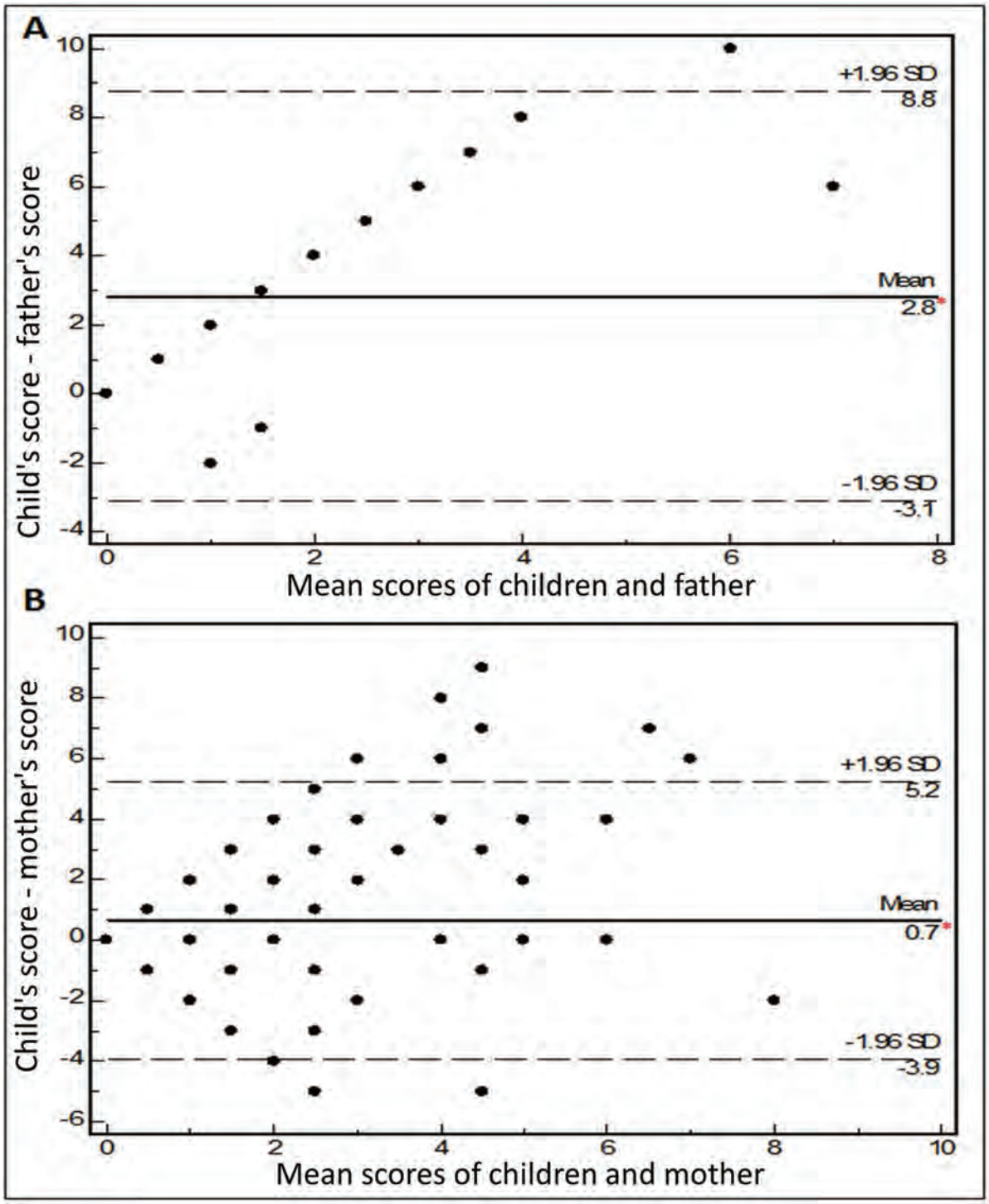


***Figure 2:*** *Bland-Altman chart for the mean differences between quality of life scores related to oral health of the child-father (A) and the mother-child (B) pairs. * Statistically significant bias.*

***Table 1:*** *Sociodemographic and clinical characteristics of study participants.*

| Variable | n | % |
|---|---|---|
| Age of child | | |
| 5 years | 155 | 65.1 |
| 6 years | 83 | 34.9 |
| Child's Sex | | |
| Male | 127 | 53.4 |
| Female | 111 | 46.6 |
| Parents sex | | |
| Male | 43 | 18.1 |
| Female | 195 | 81.9 |
| Family income | | |
| ≤ 1 salary | 174 | 73.1 |
| 1 a 2 salaries | 46 | 19.3 |
| > 2 salaries | 18 | 7.6 |
| Dental caries | | |
| No experience of caries | 68 | 28.6 |
| Low caries experience | 96 | 40.3 |
| High caries experience | 74 | 31.1 |
| Traumatic dental injuries | | |
| Absent | 184 | 77.3 |
| Present | 54 | 22.7 |

***Table 2:*** *Mean ± Standard deviation of quality of life related to OHRQoL (child's own perception), according to the child's age, dental caries experience and traumatic dental injuries.*

| Variable | Difficulty eating | Difficulty to drink | Difficulty speaking | Difficulty playing | Difficulty sleeping | Do not smile: appearance | Do not smile: pain | Total |
|---|---|---|---|---|---|---|---|---|
| Age of child | | | | | | | | |
| 5 years | 0.61 ± 0.83 | 0.37 ± 0.70 | 0.26 ± 0.59 | 0.10 ± 0.40 | 0.36 ± 0.69 | 0.19 ± 0.46 | 0.30 ± 0.62 | 2.19 ± 2.75 |
| 6 years | 0.75 ± 0.85 | 0.48 ± 0.76 | 0.46 ± 0.75 | 0.29 ± 0.65 | 0.31 ± 0.62 | 0.24 ± 0.58 | 0.28 ± 0.61 | 2.81 ± 3.13 |
| p-value* | 0.189 | 0.236 | 0.028 | 0.009 | 0.761 | 0.865 | 0.741 | 0.106 |
| Dental caries | | | | | | | | |
| Without experience | 0.37 ± 0.67[a] | 0.15 ± 0.40[a] | 0.12 ± 0.44[a] | 0.01 ± 0.12[a] | 0.12 ± 0.37[a] | 0.09 ±0.29[a] | 0.09 ± 0.38[a] | 0.94 ± 1.44[a] |
| Low experience | 0.56 ± 0.81[a] | 0.31 ± 0.64[a] | 0.29 ± 0.61[b] | 0.06 ± 0.28[a] | 0.23 ± 0.57[a] | 0.08 ± 0.28[a] | 0.21 ± 0.52[a] | 1.75 ± 2.05[b] |
| High experience | 1.04 ± 0.88[b] | 0.78 ± 0.88[b] | 0.57 ± 0.80[c] | 0.45 ± 0.78[b] | 0.70 ± 0.84[b] | 0.49 ± 0.73[b] | 0.58 ± 0.78[b] | 4.61 ± 3.51[c] |
| *p*-value* | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| TDI | | | | | | | | |
| Absent | 0.60 ± 0.82 | 0.35 ± 0.67 | 0.28 ± 0.60 | 0.13 ± 0.45 | 0.31 ± 0.65 | 0.19 ± 0.46 | 0.28 ± 0.60 | 2.14 ± 2.74 |
| Present | 0.85 ± 0.88 | 0.61 ± 0.83 | 0.50 ± 0.82 | 0.30 ± 0.66 | 0.46 ± 0.72 | 0.28 ± 0.63 | 0.33 ± 0.64 | 3.33 ± 3.24 |
| *p*-value* | 0.045 | 0.026 | 0.081 | 0.039 | 0.073 | 0.580 | 0.490 | 0.009 |

***Note:*** *TDI, traumatic dental injuries; * Mann-Whitney test; † Kruskal-Wallis test [a, b, c values followed by vertical letters (column) do not differ statistically from one another by the Mann-Whitney test].*

***Table 3:*** *Mean ± Standard deviation of quality of life related to OHRQoL (parents 'perception), according to the parents' gender.*

| Variable | Difficulty eating | Difficulty speaking | Difficulty playing | Difficulty sleeping | Stopped smiling: appearance | You stopped smiling: caries or pain | Affected self esteem | Total |
|---|---|---|---|---|---|---|---|---|
| Sex of the parents | | | | | | | | |
| Male | 0.14 ± 0.56 | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.10 ± 0.63 | 0.10 ± 0.43 | 0.02 ± 0.15 | 0.02 ± 0.15 | 0.28 ± 0.89 |
| Female | 0.47 ± 0.86 | 0.26 ± 0.72 | 0.12 ± 0.57 | 0.31 ± 0.84 | 0.25 ± 0.70 | 0.27 ± 0.74 | 0.22 ± 0.64 | 1.82 ± 2.85 |
| *p*-value* | 0.003 | 0.006 | 0.134 | 0.041 | 0.096 | 0.020 | 0.028 | <0.001 |

**Note**:* *Mann-Whitney Test.*

***Table 4:*** *Agreement between parent-child pairs responses to items that make up the oral health-related quality of life instrument for children.*

| Items | Parent response | Child's response | | | Kappa | *p*-value |
|---|---|---|---|---|---|---|
| | | No | Little | A lot | | |
| Difficulty eating | No way | 20 | 9 | 11 | - 0.01 | 0.905 |
| | Little / more or less | 2 | 0 | 0 | | |
| | Quite a lot | 0 | 0 | 1 | | |
| Difficulty speaking | No way | 28 | 8 | 6 | — | — |
| | Little / more or less | 0 | 0 | 0 | | |
| | Quite a lot | 0 | 0 | 0 | | |
| Difficulty playing | No way | 35 | 3 | 4 | — | — |
| | Little / more or less | 0 | 0 | 0 | | |
| | Quite a lot | 0 | 0 | 0 | | |
| | | | | | | |
| Do not smile: appearance | No way | 30 | 7 | 3 | — | — |
| | Little / more or less | 1 | 0 | 1 | | |
| | Quite a lot | 0 | 0 | 0 | | |
| Do not smile: caries or pain | No way | 26 | 8 | 8 | — | — |
| | Little / more or less | 1 | 0 | 0 | | |
| | Quite a lot | 0 | 0 | 0 | | |

***Note:****The Kappa statistic could not be calculated due to the absence of frequency (n = 0) in one or more categories.*

***Table 5:*** *Agreement between the responses of the mother-child pairs to the items that make up the instrument of quality of life related to oral health for children.*

| Items | Parent response | Child's response | | | Kappa | *p*-value |
|---|---|---|---|---|---|---|
| | | No | Little | A lot | | |
| Difficulty eating | No way | 87 | 25 | 24 | 0.07 | 0.138 |
| | Little / more or less | 24 | 9 | 17 | | |
| | Quite a lot | 4 | 1 | 3 | | |
| Difficulty speaking | No way | 135 | 13 | 15 | 0.13 | 0.016 |
| | Little / more or less | 15 | 6 | 4 | | |
| | Quite a lot | 4 | 1 | 0 | | |
| Difficulty playing | No way | 166 | 8 | 10 | -0.02 | 0.750 |
| | Little / more or less | 6 | 0 | 0 | | |
| | Quite a lot | 3 | 1 | 0 | | |
| Difficulty sleeping | No way | 131 | 21 | 15 | -0.01 | 0.913 |
| | Little / more or less | 14 | 1 | 3 | | |
| | Quite a lot | 7 | 2 | 1 | | |
| Do not smile: appearance | No way | 143 | 17 | 5 | 0.06 | 0.298 |
| | Little / more or less | 18 | 4 | 1 | | |
| | Quite a lot | 4 | 1 | 0 | | |
| Do not smile: caries or pain | No way | 144 | 13 | 7 | 0.19 | 0.001 |
| | Little / more or less | 14 | 6 | 4 | | |
| | Quite a lot | 4 | 2 | 0 | | |

***Note:****The Kappa statistic could not be calculated due to the absence of frequency (n = 0) in one or more categories.*

***Table 6:*** *Agreement between children and parents for total oral health quality of life scores.*

| | Child's score | Parents' score | *p*-value* | Coefficient of Lin (IC95%) |
|---|---|---|---|---|
| Child vs. father | 3.08 ± 3.14 | 0.23 ± 0.78 | <0.001 | 0.07 (-0.01 – 0.15) |
| Child vs. mother | 1.78 ± 2.29 | 1.12 ± 1.61 | <0.001 | 0.29 (0.17 – 0.40) |

***Note****:* Wilcoxon test.*

# DISCUSSION

We sought to investigate the participation of caries disease in quality of life in children aged 5 and 6 years. For evaluation we used Scale of Oral Health Outcomes for 5-year-old children (B-SOHO-5) which, despite being developed for 5-year-olds, was used by the authors who made the cross-cultural adaptation between 5-year-olds and 6 years.[9] The results showed that there was a negative repercussion for the quality of life in relation to all aspects of oral health evaluated in this study, from the perspective of the child, this finding is in accordance with another study[12] performed with children of the same age group , using the same instrument.[4-6,12]

In the evaluation of OHRQoL, regarding age, there was no difference between the groups for almost all the evaluated items, except for the difficulty to talk and play, which were reported by children aged 6 years as a negative factor for their quality of life. In another study carried out with preschool children using the Early Childhood Oral Health Impact Scale (ECOHIS), it was observed that the child's age group has a negative impact on quality of life, in which children who had between 24-35 months had a lower impact than children from 36-47 months and greater than 48 months.[17] One likely explanation for the difficulty of speaking may be the physiological loss of dental units that occurs close to this period and could lead to phonoarticulatory difficulties. It is also important to note that, although not statistically significant, children aged 6 years old had higher scores in all evaluated subjects, with higher quality of life impairment with the instruments used in the evaluation. This finding in the present study can be understood from the psychological development of the child, from the sixth year of age, begins the abstract thinking and the understanding of the self-image where it develops the ability to compare their physical

characteristics, thus having a better perception about their quality of life.[18]

In the case of caries experience, there was a negative and statistically significant interference of this condition on children's quality of life, worsening with the progression of the disease in the evaluation of the general score, as well as the difficulty to speak negatively the low caries experience when compared to the absence of caries experience, the difficulty to speak and the total result. Studies in preschoolers agree with our findings, indicating that there is a greater negative impact on children's OHRQOL as the caries experience increases.[9,12,17] However, another study has observed, from the use of ECOHIS, that caries negatively impacted similarly among children aged 6 to 72 months regardless of the severity of the disease.[19]

Studies that evaluated the impact of TDI on OHRQoL in children aged 6 years or less are reduced and conflicting, as there is no consensus regarding the impact of TDI on children's OHRQoL.[9, 20] In the present study, it was verified that the TDI, according to the children's perception, had a negative impact on the OHRQoL in specific aspects such as difficulty in eating, drinking and playing, as well as in the overall result. The item difficulty in playing was also pointed out, and it inferred negatively in the QVRSB when analyzed the behavior of the TDI, although it was not associated with the general score, according to the children's perception.[9] In another study,[21] children who had complicated TDI had a negative impact on OHRQoL, affecting in daily activities such as sleeping and smiling, causing pain. However, another study with pre-school children, using the ECOHIS data collection instrument,[22] presented divergent results, stating that TDI does not have a negative impact on the OHRQoL of preschool children. It is assumed that the differences found are based only on the secondary reports of the parents, while the present study used B-SOHO-5 that takes into account both the parents' and the child's reports.

When comparing the perception of the parents regarding the OHRQoL, it was observed that the mothers identified a poorer quality of life in relation to the father figure, related to difficulty eating, talking and sleeping, as well as issues related to esteem. Recent studies agree with the research in question, one conducted in Saudi Arabia with pre-school children, which used ECOHIS[23] and another in the state of São Paulo with B-SOHO-5.[24] However, in another study carried out with school-age children, no significant differences were observed between the reports of mothers and fathers regarding their children's OHRQoL, in which two quality of life questionnaires were used (ILC) and the Kinder Lebensqualität Fragebogen (KINDL).[25]

The responsibility of the health of pre-school children is of the parents who, in turn, make decisions about their health,[26] even though they are the decision makers about the oral health of their children, there is still little number of studies evaluating the concordance between self reports and secondary reports of parents regarding the OHRQoL of children under 8 years of age.[9] The results of the present study showed that children tend to evaluate their OHRQoL with more impairment than their parents' perception, regardless of their gender. This raises the possible underestimation of parents regarding the oral health of their children. There was also divergence in reports from the parent-child pair and poor agreement on the mother-child pair on items such as "difficulty speaking" and "stopped smiling because of caries or pain." Therefore, it can be pointed out that both the father and the mother are not good evaluators of the oral health of their child, with a slight preference for the mothers' report. This fact can be attributed to the mother figure who assumes the role of caregiver in society and, by a cultural question, parents are seen as the financial providers of the family.[24]

Two other studies evaluated the concordance of parent-child and mother-child pairs with regard to OHRQoL.[27, 28] One study conducted with 12-year-old children in China showed that there was a significant disagreement between the parents' reports, regardless of gender, regarding the children's perception, showing that both children did not respond reliably to their children's OHRQoL.[28] In the second study, carried out with 5 and 6-year-old children using B-SOHO-5 as a data collection instrument, there was a significant disagreement in the report of the father-child pair, in which the children evaluated their OHRQoL as more compromised than the assessment of his father corroborating the findings of the present study. Although in the same study, there was agreement between the report of the mother-child pair, where it was observed that the mothers evaluated the OHRQoL of their children as more compromised than the children's report.[27] The divergences evaluated in this study regarding the mother-child pair may be related to ethnic cultural context and socioeconomic factors.[27] Overall, in the studies, there was a significant disagreement in the father-child reports in all studies analyzed, suggesting that the father is not a good secondary responder about the OHRQoL of his children. However, it is necessary to emphasize the need for secondary reports of family members, especially the mother's in clinical consultations, so that information is complemented, allowing the professional to make the best decisions regarding clinical behavior.[24]

It is worth mentioning that some limitations are present in this study. Among them, we highlight the cross-sectional design, which does not allow inferences about the causality of the observed associations. Another limitation is

that the sample of this study was of convenience, the data have clinical relevance, although they can not be extrapolated to population levels.

This study is of great clinical value since parents are instrumental in providing complementary information on the child's health as well as being responsible for the choice of treatment provided to their children, but the importance of taking into account the In addition, it is suggested that new research be done on children's OHRQoL, taking into account not only the parents' perception, but also the self-report of the child.

## CONCLUSION

Caries disease and TDIs have a negative impact on OHRQoL according to the children's perception, although there is no significant impact on the perception of the parents. The child evaluates his OHRQoL with more commitment than the assessment of his / her responsible parents. The disagreement / poor agreement between the father's and mother's reports on the children's OHRQoL indicated that both the father and the mother are not good evaluators of the oral health of their sons/dougthers.

## REFERENCES

1. Ribeiro GLea. O potencial impacto financeiro dos problemas bucais na família de pré-escolares. Ciênc saúde coletiva, Rio de Janeiro Apr. 2016 v. 21(n. 4):1217-26.

2. Glendor U. Epidemiology of traumatic dental injuries—a 12 year review of the literature. Dent Traumatol. 2008;24(6):603-11.

3. Vadiaskas G. Case definition, aethiology and riskk assessment of early childhood caries (ECC): a revisited review. Eur Arch Paediatr Dent. 2008:114-25.

4.Abanto J, Ortega AO, Raggio DP, Bonecker M, Mendes FM, Ciamponi AL. Impact of oral diseases and disorders on oral-health-related quality of life of children with cerebral palsy. Spec Care Dentist. 2014;34(2):56-63.

5.Kramer PF FC, Ferreira SH, Bervian J, Rodrigues PH, Peres MA. Exploring the impacto f oral diseases and disorders on quality of life of preschool children. Community Dent Health. 2013;41:327-35.

6.Wong HM, McGrath CP, King NM, Lo EC. Oral health-related quality of life in Hong Kong preschool children. Caries Res. 2011;45(4):370-6.

7.Sheiham A. Dental caries affects body weight, growth and quality of life in pre-school children. Br Dent J. 2006;201(10):625-6.

8.Tang RS; Huang MC; HuanG ST. Relationship between dental caries status and anemia in children with severe early childhood caries. Kaohsiung J Med Sci. 2013;29:330-6.

9.Alvarez JHA. Adaptação transcultural, propriedades psicométricas e aplicação da versão brasileira do B-SOHO-5, instrumento de qualidade de vida relacionada à saúde bucal para crianças de 5 anos de idade. São Paulo: Tese (Doutorado) - Curso de Odontologia, Faculdade de Odontologia da Universidade de São Paulo; 2012.

10. Jokovic A, Locker D, Stephens M, Kenny D, Tompson B, Guyatt G. Measuring parental perceptions of child oral health-related quality of life. J Public Health Dent. 2003;63(2):67-72.

11. Yusuf Hea. Validation of an English version of the Child-OIDP index, an oral healthrelated quality of life measure for children. Health and Quality of Life Outcomes. 2006:p.1-7.

12. Abanto J, Tsakos G, Paiva SM, Carvalho TS, Raggio DP, Bonecker M. Impact of dental caries and trauma on quality of life among 5- to 6-year-old children: perceptions of parents and children. Community Dent Oral Epidemiol. 2014;42(5):385-94.

13. Varni JW, Seid M, Kurtin PS. PedsQL 4.0: reliability and validity of the Pediatric Quality of Life Inventory version 4.0 generic core scales in healthy and patient populations. Med Care. 2001;39(8):800-12.

14. Tsakos G, Blair YI, Yusuf H, Wright W, Watt RG, Macpherson LM. Developing a new self-reported scale of oral health outcomes for 5-year-old children (B-SOHO-5). Health Qual Life Outcomes. 2012;10:62.

15. Landis JR KG. The measurement of observer agreement for categorical data. Biometrics. 1977;33:159-74.

16. J C-S. Coeficiente de concordância para variables continuas. . Acta Médica Costarricense 2008;50:211-2.

17. Fernanda Guzzo Tonial1 CM, Larissa Corrêa Brusco Pavinato3, Juliane Bervian3, Franciele. Impact of caries disease on the quality of life of preschoolers who received medical care at the clinic of the University of Passo Fundo (UPF/RS). Arq Odontol. 2015;51(1):47-53.

18. Hetherington EM PR, Locke VO. Childpsychology: a contemporary viewpoint. Companies TM-H, editor. New York1999.

19. Fernanda de Carvalho CASTRO1 DPR, José Carlos P. IMPARATO3, Chaiana PIOVESAN4, Gabriela Cunha BONINI3. Impact of Oral Problems on the Quality of Life of Preschool Children. Pesq Bras Odontoped Clin Integr. 2013;13(4):361-69.

20. Abanto J, Carvalho TS, Mendes FM, Wanderley MT, Bonecker M, Raggio DP. Impact of oral diseases and disorders on oral health-related quality of life of preschool children. Community Dent Oral Epidemiol. 2011;39(2):105-14.

21. Aldrigui JM, Abanto J, Carvalho TS, Mendes FM, Wanderley MT, Bonecker M, et al. Impact of traumatic dental injuries and malocclusions on quality of life of young children. Health Qual Life Outcomes. 2011;9:78.

22. Siqueira MB FR, Clementino MA, Martins Impact of Traumatic Dental Injury on the Quality of Life of Brazilian Preschool Children. Int J Environ Res Public Health. 2013;10:6422-41.

23. Pani SC BL, Mirza S, Elbaage n. Differences in perceptions of early childhood oral healthrelated quality of life between fathers

and mothers in Saudi Arabia. International Journal of Paediatric Dentistry 2012;22:244–9.
24. Abanto J, Tsakos G, Paiva SM, Raggio DP, Celiberti P, Bonecker M. Agreement between children aged 5-6 years and their mothers in rating child oral health-related quality of life. Int J Paediatr Dent. 2014;24(5):373-9.
25. Jozefiak T LB, Wichstrom, Mattejat, Ravens-Sieberer Quality of Life as reported by school children and their parents: a cross-sectional survey. Health and Quality of Life Outcomes 2008:6:34.
26. Bonecker M, Abanto J, Tello G, Oliveira LB. Impact of dental caries on preschool children's quality of life: an update. Braz Oral Res. 2012;26 Suppl 1:103-7.
27. Abanto Jenny CT, Peters Bianca Glerean, Paiva Saul martins, Bönecker Marcelo. Concordância entre os relatos do núcleo familiar em relação à qualidade de vida da criança. Rev Assoc Paul Cir Dent. 2014.
28. Zhang M MC, Hägg U. Who knows more about the impact of malocclusion on children's quality of life, mothers or fathers? . Eur J Orthod 2007;29:180-5.

# ORAL HEALTH, IMPACT OF PAIN IN THE LIFE AND PERCEPTION OF USERS ATENDED AT FAMILY HEALTH STRATEGY OF PIRAÍ-RJ

Thais Rodrigues Campos **Soares**[1], Lucas Alves **Jural**[1], Thayssa Augusto Assis de **Araújo**[1], Ivan Rafael de Oliveira **Calabrio**[1], Ana Paula Ganem Rosas Martins **Ferreira**[2], Juliana Alves Ferreira **Ganem**[3], Solange Carraro Ganem da **Silva**[4], Mirella **Giongo**[5], Maria Cynésia Medeiros de Barros **Torres**[6], Lucianne Cople **Maia**[1*]

[1]Department of Paediatric Dentistry and Orthodontics, School of Dentistry, Federal University of Rio de Janeiro, Rio de Janeiro, RJ, Brazil.
[2]Manager of the Center of Dental Specialties of the Municipality of Piraí, RJ, Brazil.
[3]Dentist of the Family Health Program of the Casa Amarela Unit, Piraí, RJ, Brazil.
[4]Dentist of the Family Health Program of the Ponte das Laranjeiras Unit, Piraí, RJ, Brazil.
[5]Department of Social Dentistry, Faculty of Dentistry, Federal University of Rio de Janeiro, Rio de Janeiro, RJ, Brazil.
[6]Department of Dental Clinic, School of Dentistry, Federal University of Rio de Janeiro, Rio de Janeiro, RJ, Brazil.

**Palavras-chave:** Saúde Bucal. Percepção Social. Odontalgia.

**RESUMO**

**Objetivo:** identificar as características das demandas por serviços de emergência relacionados à dor nas unidades de saúde da cidade de Piraí, Rio de Janeiro; o grau de satisfação e as percepções dos usuários sobre o serviço prestado quando a necessidade está ligada a situações de urgência relacionadas à dor dentária. **Métodos:** Usuários das unidades públicas de saúde responderam, durante maio de 2013 até novembro de 2014, através de questionários, dados referentes a sexo, idade, renda familiar mensal, classe econômica, experiências nos serviços de emergência e um questionário McGill para dor validado para a língua portuguesa. Os dados foram analisados descritivamente e pelo teste Qui-quadrado ($p<0,05$). **Resultados:** Foram incluídos 137 usuários (40,22 ± 15,74 anos), 73,7% do sexo feminino, 59,9% da classe C e 43,8% com renda entre ½ e 1 salário mínimo. Do total, 54% sentiram alguma dor relacionada a problemas bucais nos últimos 12 meses antes do questionário e destes, 71,6% foram atendidos no serviço, 58% não encontraram dificuldades para obter atendimento, 68,9% resolveram o problema e 73% estavam satisfeitos com o serviço prestado. Apenas 37,2% dos usuários não relataram prejuízo social no trabalho ou no lazer causado por dor dentária. A faixa etária esteve associada à dor relacionada a problemas bucais nos últimos 12 meses ($p=0,02$) e à necessidade de consultas de emergência no mesmo período ($p=0,005$). **Conclusão:** A maioria dos indivíduos atendidos em serviço público era do sexo feminino, a classe econômica e a renda familiar predominante eram, respectivamente, classe C e de ½ a 1 salário mínimo; Dor de dente e dor ao beber líquidos frios ou quentes foram as queixas mais comuns nos últimos 12 meses; Existe associação entre idade e presença de dor dentária e necessidade de tratamento urgente; os participantes deste estudo se consideraram satisfatoriamente atendidos na maioria dos casos.

**Keywords:** Oral Health. Social Perception. Toothache**.**

**ABSTRACT**

**Objective:** to identify the characteristics of the demands for emergency services related to pain in health units in the city of Piraí, Rio de Janeiro; the degree of satisfaction and the perceptions of users about the service provided when the need is linked to emergency situations related to dental pain. **Methods:** Users of public health units answered, between May 2013 and November 2014, through questionnaires, data regarding sex, age, monthly family income, economic class, experiences in emergency services and a McGill pain questionnaire validated for the Portuguese language. The data were analyzed descriptively and using the Chi-square test ($p<0.05$). **Results:** 137 users were included (40.22 ± 15.74 years), 73.7% female, 59.9% from class C and 43.8% with an income between ½ and 1 minimum wage. Of the total, 54% felt some pain related to oral problems in the last 12 months before the questionnaire and of these, 71.6% were seen at the service, 58% did not find it difficult to get care, 68.9% solved the problem and 73% were satisfied with the service provided. Only 37.2% of users did not report social damage at work or at leisure caused by dental pain. The age group was associated with pain related to oral problems in the last 12 months ($p=0.02$) and the need for emergency consultations in the same period ($p=0.005$). **Conclusions:** The majority of individuals who are attended in public service being female, the economic class and the predominant family income were, respectively, class C and of ½ to 1 minimum wage; Toothache and pain when drinking cold or hot liquids were the most common complaints in the last 12 months; There is an association between age and presence of dental pain and the need for urgent treatment; and participants in this study are considered to have been satisfactorily treated in most cases.

Submitted: September 17, 2019
Modification: Febuary 26, 2020
Accepted: March 3, 2020

***Correspondence to:**
Lucianne Cople Maia
Address: Caixa Postal: 68066 – Cidade Universitária- CCS
Zip code: 21941-971 - Rio de Janeiro – RJ – Brazil. - E-mail: rorefa@terra.com.br
Telephone number: +55 (21) 25622098

## INTRODUCTION

According to the World Health Organization (WHO), health can be defined as a state of complete physical, mental and social well-being and not just absence of disease or disability.[1] In this way the term health refers to an individual's subjective experiences of his or her own physical body and of his objective personal life experiences. As such, it is a sociological and psychological concept that can be applied both at the individual level and at the population level.[2] In this context, the First National Oral Health Conference established that oral health constitutes an integral and inseparable part of general health. [3] Oral health can be defined as the ability to speak, smile, smell, taste, touch, chew, swallow and convey a range of emotions through facial expressions with confidence and without pain, discomfort and disease of the craniofacial complex.[4]

A more complete way of assessing oral health involves the individual's perception of their oral condition. In this way, the term "quality of life related to oral health" emerged, whose definition would be: the impact of diseases and oral disorders in the daily life of a patient or person, which are of sufficient magnitude in terms of frequency, severity or duration to affect your experience and the perception of your life in general. [5]

Whether due to the health problems located in the mouth or the difficulties encountered in accessing care services, teeth and gums register the impact of the precarious living conditions of many Brazilians throughout the country. From functional illiteracy to low schooling, low income, lack of work, and, finally, determinants and social determinants corroborate in a devastating way with the poor quality of oral health. [6]

In this sense, the National Oral Health Survey - 2010, known as SBBrasil Project 2010, analyzed the Brazilian population's situation regarding dental caries, gum diseases, dental prosthesis needs, occlusion conditions, fluorosis, dental trauma and occurrence of toothache, among other aspects, with the objective of providing the Ministry of Health and institutions of the Unified Health System (SUS), useful information to the planning of prevention and treatment programs in the sector, both at the national level and at the municipal level. [7]

Considering the importance of dental pain in Public Health, the objective of this study was to identify the characteristics of the demands for emergency services related to pain in the health units of the city of Piraí, Rio de Janeiro; the degree of satisfaction and the perceptions of the users about the service provided when the need is linked to urgent situations related to dental pain.

## MATERIALS AND METHODS

The present study integrates the PRO-PET Health Program of the Federal University of Rio de Janeiro in the Municipality of Piraí, where it sought to develop its analysis based on users' experience of the Oral Health Network of Piraí with regard to dental pain and dental urgency.

The Municipal Health Department of Piraí - RJ has been qualified under the Full Management System of the Municipal System NOB 01/02 since 2003. This network currently has 11 Units, in which 13 Family Health Teams and 13 Oral Health Teams are allocated. In addition, it serves 04 complementary units (Serra do Matoso, Light, Fazendinha, Sanatório da Serra), with 100% coverage of the population by the Family Health Strategy since 2003[8]. The resident population was estimated to be 27,579 on July 1, 2014 (published in the Official Gazette of the Union on 08/28/2014[9]). It also offers 01 Health Surveillance Unit, 02 Specialized Centers (medical and dental), 01 Psychosocial Care Center (CAPS), 01 General Hospital, 01 Emergency Care Unit, 01 Physical Therapy Center 01 Laboratory of Clinical Pathology, 01 Laboratory of Dental Prosthesis, 01 Municipal Pharmacy, and 01 SAMU decentralized base.

Following approval from the Research Ethics Committee under number 274.628, this cross-sectional observational study assessed users of the Family Health Strategy of the city of Piraí, Rio de Janeiro, regardless of age, gender, and ethnicity. The study was divided into two stages: 1) elaboration of a set of questions to improve the experience of users of the Family Health units of the municipality of Piraí and 2) the forms were applied in the units by previously trained researchers.

All subjects who met the eligibility criteria were invited to participate in the study. The eligibility criteria included users who were able to read and write and who sought care in the public network, such as in hospitals and health units of the municipality of Piraí. All units (hospitals and public health units) participated in this study. All participants signed informed consent/consent forms. Individuals under 18 who answered the questionnaire signed a consent form after obtaining their guardian's consent. Illiterate patients and patients with neurological and/or metabolic diseases influencing pain mechanisms were excluded from the present study.

The data collection instruments used were questionnaires to identify details about the urgencies related to dental pain in the last 12 months. The instruments were applied in an appropriate location outside the dental care setting. The questionnaires were applied from May 2013 to November 2014. Data were collected twice a week in the morning and afternoon.

These data included gender (female and male), age (according to SB Brazil 2010[7] age groups of 15 to 19, 20 to 34, 35 to 44, 45 to 64, and over 65 years), family income (household total income was calculated by adding the income reported by those individuals who worked and were classified as receiving up to 1/2, 1 to 2, 2 to 3, 3 to 5, and above 5 minimum wages) and socioeconomic classification, which was measured using the Brazilian Economic Classification Criterion (Associação Brasileira de Empresas de Pesquisa. http://www.abep.org.br, accessed on May/2013 and Nov/2014). This criterion is constructed by assigning scores to the number of household assets and head-of-family's schooling. Social strata were divided in A1, A2, B1, B2, C, D, and E, with A1 as the highest social stratum and E as the lowest.

The problems related to oral health in the last 12 months were evaluated using 18 items, from which users could choose more than one. The treatment realized was evaluated by users' answers for questions regarding how difficult it was for them to obtain care in the public service, whether the problem was solved, and whether they were satisfied with the service provided. In addition, the impact of dental pain on the life of the patient was examined. The Brazilian version of the McGill pain questionnaire, proposed by Castro, was used to measure pain and its impact.[10] In this questionnaire, the patient was evaluated for issues related to social impairment, the development of daily living activities, and their perception about the reaction of third parties to their painful condition to measure the impact of orofacial pain on quality of life. Also included were questions regarding tolerance to pain, feeling of being sick, feeling of use, and satisfaction with life. It was made clear that only one number or an affirmative response could be selected for each of the sub-items. The questions were applied in the form of a questionnaire, with no time control for completion; hence, participants were not hurried during their responses.

Collected data were tabulated using the SPSS statistical program (version 21.0) and analyzed descriptively and via the non-parametric Chi-square test, with a confidence level of 95% indicating that the results were significant.

## RESULTS

One hundred and sixty-four patients were invited to participate in the study, but 27 did not agree, with 137 participants remaining. The mean age of the participants was 40.22 (± 15.74), being 35% with 20 to 34 years, the majority being female (73.7%). The economic class and the predominant family income were, respectively, class C (59.9%) and of ½ to 1 minimum wage (43.8%) (Table 1).

***Table 1:*** *Characterization of the sample (n=137).*

| | | *Absolute value* | *Relative value* |
|---|---|---|---|
| *Gender* | Female | 101 | 73.7% |
| | Male | 36 | 26.3% |
| *Age* | 15 to 19 years | 13 | 9.5% |
| | 20 to 34 years | 48 | 35% |
| | 35 to 44 years | 26 | 19% |
| | 45 to 64 years | 38 | 27.7% |
| | Over 65 years | 12 | 8.8% |
| *Family income* | Up to 1/2 minimum wage | 16 | 11.8% |
| | 1/2 to 1 minimum wage | 60 | 43.8% |
| | 1 to 2 minimum salaries | 11 | 8% |
| | 2 to 3 minimum wages | 25 | 18.2% |
| | 3 to 5 minimum wages | 15 | 10.9% |
| | Above 5 wages | 4 | 2.9% |
| | Not answered | 6 | 4.4% |
| *Economic Classification* | Class A1/A2 | 1 | 0.7% |
| | Class B1/B2 | 28 | 20.4% |
| | Class C | 82 | 59.9% |
| | Class D | 21 | 15.3% |
| | Class E | 5 | 3.7% |

When asked if they ever felt any pain related to a problem in their mouths or in their gums in the last 12 months before the questionnaire, 54% said yes. Of these, 71.6% were able to treat the problem in the public service, 58% did not find it difficult to get care. When asked if the problem was solved, 68.9% said yes and 73% said they were satisfied with the service provided. Descriptions of the problems reported in the 12-month period prior to the questionnaire are shown in Table 2.

***Table 2:*** *Problems related to oral health in the last 12 months (n = 137).*

| | *Absolute value* | *Relative value* |
|---|---|---|
| *Toothache** | 67 | 48.9% |
| *Pain when drinking cold or hot liquids** | 59 | 43.1% |
| *Tooth for extraction* | 46 | 33.6% |
| *Bleeding gums* | 43 | 31.4% |
| *Dissatisfaction with the smile* | 42 | 30.7% |
| *Change in tooth color* | 42 | 30.7% |
| *Broken tooth* | 41 | 29.9% |
| *Pain when chewing** | 40 | 29.2% |
| *Swelling in the mouth due to teeth* | 30 | 21.9% |
| *Difficulties in food* | 30 | 21.9% |
| *Bad breath* | 27 | 19.7% |
| *Difficulty cleaning teeth* | 21 | 15.3% |
| *Difficulty speaking* | 21 | 15.3% |
| *Difficulty in relationships* | 16 | 11.7% |
| *Pain when opening the mouth** | 15 | 10.9% |
| *Tooth mobility* | 15 | 10.9% |
| *Falling with trauma to the teeth or bones of the face* | 9 | 6.6% |
| *Secretion in the mouth or gums* | 8 | 5.8% |

***Note****: *The patient could choose more than one option.*

The results of the McGill pain questionnaire proposed by Castro (1999)[10] are shown in Tables 3 and 4. In general, only 37.2% of users related no social impairment at work or at leisure caused by oral pain. Of the total individuals, 22.6% reported that it is difficult to tolerate pain.

***Table 3:*** *Impact of pain of oral origin on user's life (n = 137).*

| | No | Little | More or less | Very | Totally / always | Not answered |
|---|---|---|---|---|---|---|
| **Social impairment** | | | | | | |
| *At work* | 51 (37.2%) | 13 (9.5%) | 15 (10.9%) | 22 (16.1%) | 14 (10.2%) | 22 (16.1%) |
| *Loss of working days* | 64 (46.7%) | 12 (8.8%) | 14 (10.2%) | 11 (8%) | 10 (7.3%) | 26 (19%) |
| *Health license* | 82 (59.9%) | 9 (6.6%) | 7 (5.1%) | 8 (5.8%) | 4 (2.9%) | 27 (19.7%) |
| *Loss of employment* | 89 (65%) | 3 (2.2%) | 6 (4.4%) | 5 (3.6%) | 7 (5.1%) | 27 (19.7%) |
| *Retirement* | 95 (69.4%) | 1 (0.7%) | 1 (0.7%) | 3 (2.2%) | 3 (2.2%) | 33 (24.8%) |
| *In school activities* | 72 (52.6%) | 7 (5.1%) | 6 (4.4%) | 9 (6.6%) | 8 (5.8%) | 35 (25.5%) |
| *At leisure* | 51 (37.2%) | 16 (11.7%) | 12 (8.8%) | 19 (13.8%) | 16 (11.7%) | 23 (16.8%) |
| *In home activities* | 60 (43.9%) | 8 (5.8%) | 17 (12.4%) | 15 (10.9%) | 13 (9.5%) | 24 (17.5%) |
| *In family relationships* | 67 (48.8%) | 7 (5.1%) | 12 (8.8%) | 12 (8.8%) | 13 (9.5%) | 26 (19%) |
| *In relationship with friends* | 63 (46%) | 10 (7.3%) | 13 (9.5%) | 13 (9.5%) | 13 (9.5%) | 25 (18.2%) |
| **Activities of daily living** | | | | | | |
| *Sleep* | 41 (29.9%) | 14 (10.2%) | 9 (6.6%) | 31 (22.6%) | 19 (13.9%) | 23 (16.8%) |
| *Initial insomnia* | 62 (45.3%) | 9 (6.6%) | 7 (5.1%) | 13 (9.5%) | 18 (13.1%) | 28 (20.4%) |
| *Terminal insomnia* | 71 (51.8%) | 3 (2.2%) | 8 (5.8%) | 7 (5.1%) | 14 (10.2%) | 34 (24.9%) |
| *Nonrestorative sleep* | 68 (49.6%) | 9 (6.6%) | 11 (8%) | 6 (4.4%) | 11 (8%) | 32 (23.4%) |
| *Appetite / food* | 35 (25.5%) | 20 (14.7%) | 17 (12.4%) | 27 (19.7%) | 15 (10.9%) | 23 (16.8%) |
| *Personal hygiene* | 71 (51.8%) | 14 (10.2%) | 10 (7.3%) | 9 (6.6%) | 10 (7.3%) | 23 (16.8%) |
| *Getting dressed* | 101 (73.7%) | 4 (2.9%) | 2 (1.5%) | 2 (1.5%) | 5 (3.6%) | 23 (16.8%) |
| *Locomotion* | 90 (65.7%) | 7 (5.1%) | 7 (5.1%) | 6 (4.4%) | 5 (3.6%) | 22 (16.1%) |
| **Perception of the Other: People** | | | | | | |
| *They are angry with me* | 86 (62.8%) | 6 (4.4%) | 5 (3.6%) | 7 (5.1%) | 6 (4.4%) | 27 (19.7%) |
| *Express frustration* | 87 (63.5%) | 6 (4.4%) | 7 (5.1%) | 4 (2.9%) | 6 (4.4%) | 27 (19.7%) |
| *They feel angry at me* | 97 (70.8%) | 2 (1.5%) | 4 (2.9%) | 2 (1.5%) | 5 (3.6%) | 27 (19.7%) |
| *They ignore me* | 97 (70.8%) | 1 (0.7%) | 2 (1.5%) | 2 (1.5%) | 8 (5.8%) | 27 (19.7%) |

***Table 4:*** *Impact of pain on user's life (n = 137).*

| | Absolute value | Relative value |
|---|---|---|
| Tolerate pain | | |
| *It is not difficult* | 24 | 17.5% |
| *It is a little hard* | 32 | 23.4% |
| *It is difficult* | 31 | 22.6% |
| *It is very difficult* | 21 | 15.3% |
| *It is impossible* | 10 | 7.3% |
| *Not answered* | 19 | 13.9% |
| Do you feel sick? | | |
| *No* | 89 | 65% |
| *A little* | 23 | 16.8% |
| *Very* | 5 | 3.6% |
| *Totally* | 1 | 0.7% |
| *Not answered* | 19 | 13.9% |
| Do you feel useful? | | |
| *Yes* | 90 | 65.8% |
| *Less than before* | 15 | 10.9% |
| *Useless* | 7 | 5.1% |
| *Very useless* | 1 | 0.7% |
| *Totally useless* | 5 | 3.6% |
| *Not answered* | 19 | 13.9% |
| Is your life satisfactory? | | |
| *Yes* | 97 | 70.9% |
| *In part* | 15 | 10.9% |
| *Unsatisfactory* | 1 | 0.7% |
| *Completely unsatisfactory* | 4 | 2.9% |
| *Not answered* | 20 | 14.6% |

***Table 5****: Relationship between age group with problems related to mouth and urgent care.*

| | | 15 to 19 years | 20 to 34 years | 35 to 44 years | 45 to 64 years | Over 65 years | Total | *P* value |
|---|---|---|---|---|---|---|---|---|
| **Have you ever felt pain related to a mouth problem in the past 12 months?** | **No** | 6 (9.5%) | 16 (25.4%) | 15 (23.8%) | 16 (25.4%) | 10 (15.9%) | 63 (100%) | 0.02* |
| | **Yes** | 7 (9.5%) | 32 (43.2%) | 11 (14.9%) | 22 (29.7%) | 2 (2.7%) | 74 (100%) | |
| **Have you already had to be taken care of urgently because of problems related to your teeth, gums, or any other part inside or around your mouth in the last 12 months?** | **No** | 10 (14.5%) | 18 (26.1%) | 12 (17.4%) | 19 (27.5%) | 10 (27.5% | 69 (100%) | 0.005* |
| | **Yes** | 1 (1.6%) | 28 (43.8%) | 14 (21.9%) | 19 (29.7%) | 2 (3.1%) | 64 (100%) | |

***Note****: Chi-square test * Statistical significance (p<0.05).*

Of the total patients who had a toothache in the last 12 months, 9.5% had 15 to 19 years old, 43.2% had 20 to 34 years old, 14.9% had 35 to 44 years old, 29.7% had 45 to 64 years old and 2.7% had over 65 years.

The relationship between age and dental pain due to urgent oral problems in the last 12 months showed statistical significance (p = 0.02), as well as the need for urgent care in the same period (p=0.005) (Table 5).

# DISCUSSION

This study evaluated the characteristics of the demands for emergency services related to dental pain in the health units of the city of Piraí, Rio de Janeiro. The literature shows that women use dental public services more than men.[11] These results corroborate the findings of the present study because most of the analyzed users were women. Age is also considered to be an important factor in seeking care, and users aged 20 to 64 years were the most frequent; this high frequency may be explained by the requirement for urgent care because these patients have more teeth than the elderly and a more active working life than younger patients and as a result, their oral care decreases.[12]

Oral diseases have a significant impact on people's quality of life and cause restrictions with respect to learning and life productivity. In this sense, such diseases are significant impediments to school, work, and domestic activities, interfering economically and socially in the development of populations, particularly the most vulnerable ones.[2,5,6] In addition, pain of dental origin is one of the main reasons for seeking health services and dental care for several age groups,[7,11] and therefore, the National Health Survey contains questions that provide data regarding these areas.[6]

Pain can be defined as an unpleasant or distressing impression resulting from injury, contusion, or anomalous state of the organism or a part of it; it involves physical or moral suffering, can affect individuals in different ways, and may cause varying impacts on life. [13] When assessing dental pain impact on the life of patients in the present study, such pain was listed as a reason for seeking dental care and was also related to social impairment at work, leisure, and daily life activities, such as sleep and eating. Hence, dental pain was found to severely interfere with a number of dimensions of people's lives.

SB Brazil 2010,[7] one of the largest oral health epidemiological surveys, carried out by the Ministry of Health, found that one of the main reasons for visiting the dentist was dental pain, which in the present study was reported by 48.9% of users, being more common in patients aged 20 to 34 years and less frequent in younger and older patients. These results corroborate findings in the literature that observed a high prevalence of dental pain in patients who seek care in a public service. In addition, these results also reinforce the negative impact that dental pain causes on individuals' quality of life.[14,15,16]

In certain circumstances, this high prevalence and intensity of dental pain are associated with gender, age, presence of carious cavities in the deciduous dentition, and number of dental visits. Corroborating the literature data, in the present study, the occurrence of pain related to a problem in the mouth was associated with age and the requirement for urgent care.[10,17,18]

Other oral problems found in the present study, such as dissatisfaction with the smile, presence of pain when drinking fluids, and gingival bleeding are also related to the negative impact on quality of life.[15,16]

Among the significant challenges for health care effectiveness at the national level is the identification of a relevant barrier referred to as "access" and how it is provided to users. The overwhelming historical demands for oral health in the public service typically reinforce the absence of care and contravene the universality, equity, and completeness principles proposed in Brazilian law.[12]

Access to an oral health service is an integral part of the constitutional law related to the principle of health comprehensiveness in the SUS. In this sense, for this right to be guaranteed in real life, access, as well as the effectiveness of care form part of the efforts that have been implemented since 2003 by the Ministry of Health, in the Department of Health Care by the Department of Primary Care/Oral Health Coordination, with the implementation of the National Oral Health Policy: Smiling Brazil Program.[19] This policy has as its perspective the integral vision of the health-disease process and proposes that health care be structured in networks of assistance to oral health, with articulation in the three levels of attention: Basic Care (in the Family Health Strategy model), Medium Complexity - Odontological Specialties Centers, and High Complexity in the hospital network (Federal, State, and Municipal), besides access to the units of prompt service – UPAs.[19] Although the Oral Health program is inserted in the context of the Family Health Strategy, this care model does not have significant effects in terms of less curative treatment and in the expansion of individual or collective preventive actions. Despite advances in access, reception, and bonding, few results in health promotion, territorialization, and interdisciplinary approach are observed in practice.[20] In the present study, there was a wide acceptance of the users to the service, with most of them being able to have their dental pain treated and without having difficulty accessing health services. In addition, the results demonstrated that most of the users felt satisfied with the service provided, as was also

determined in the studies of Santos et al. (2015) and Martins et al. (2015).[21,22]

The meaning of the term "inclusion" in the oral aspect has important social reverberations, including the perspective of the mouth in terms of access to employment, in the affectivity and socialization of individuals, as well as the maintenance of essential conditions for life.

Today in Brazil, we have a new panorama in the implantation of oral health networks with access to basic care and medium complexity. However, despite the "new" programmatic identity being assured by the policy, unfortunately in part of the municipalities, oral health care issues that differ from the proposed model still persist. In these services, the focus is privileged, or better said, directs the attention only by spontaneous demand (emergencies), and dental treatments have as their exclusive origin the arrival of a dental complaint (i.e., this assistance refers to the attention produced by the biomedical, disease-centered model, in detriment of the strategic planning based on the local diagnosis from the perspective of integrality and longevity of care). The demand exacerbated by emergency and specialized services (with all of the consequences that follow), despite being explained by social imaginary and medical-dental-industrial complex influences, is also modulated by the offerings and capacity for basic care, mainly due to the qualification of human resources.[23]

However, "free demand" is a real need in the territories, observing the historical void of attention to the implementation of the National Oral Health Policy; these moments of users' suffering should stimulate the potential for the creation and strengthening of links. These are situations in which these users and their families feel vulnerable and helpless and, with the programmatic perspective in mind, it is essential to create links between professionals and users, establishing bonds of trust. This host should be transformed into longitudinal care with the reorientation of timely dental assistance logic.[24]

This study has methodological limitations because it is cross-sectional in nature and evaluates a convenience sample of service users whose dental pain prevalence in the last 12 months may have been even lower than for those who did not access the system. Because the instrument used is a questionnaire completed by the user, the number of unmarked responses can be considered to be a limitation of the study.

Users and their families can be accommodated for in oral health services in different ways, from the planned structuring of access, whether scheduled or not. In this case, the implantation of the spontaneous demand causes changes in the organization of the teams, in the relationships between workers and in the modes of care, particularly with respect to the humanization of health services, and based on the principles of ethics and citizenship[6,24].

# CONCLUSIONS

According to the objectives of the present study, it was possible to conclude that:

- Most individuals who attended public services were female; their economic class and predominant family income were, respectively, class C and ½ to 1 minimum wage;
- Toothache and pain when drinking cold or hot liquids were the most common complaints in the last 12 months;
- There is an association between age and presence of dental pain and the need for urgent treatment;
- Participants in this study are considered to have been satisfactorily treated in most cases.

# Acknowledgments

The authors thank the MEC, the PET health of the UFRJ and the oral health coordination of the municipality of Piraí.

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) – finance code 001, FAPERJ (E-26/010.100992/2018), CNPq 159961/2018-1 and PIBIc CNPq 121908/2019-4.

# REFERENCES

1. WORLD HEALTH ORGANIZATION. Oral health surveys – basic methods. 4 ed. Geneva, 1997

2. Locker D. Measuring oral health: socio-dental indicators. In: An introduction to behavioral science & dentistry. (D. Locker, org.) New York: Routledge, 1997.

3. Brasil. Ministério da Saúde. Relatório final da 1ª Conferência Nacional de Saúde Bucal. Brasília (DF): Ministério da Saúde, 1986

4. Glick M, Williams DM, Kleinman DV, Vujicic M, Watt RG, Weyant, RJ.. A new definition for oral health developed by the FDI World Dental Federation opens the door to a universal definition of oral health. JADA. 2016;147(12):915–917.

5. Locker D, Allen F. What de measures of 'oral quality of life' measure? Community Dent Oral Epidemiol. 2007,35:401-411.

6. Narvai PC. Avanços e desafios da Política Nacional de Saúde Bucal no Brasil. Revista Tempuas Actas de Saúde Coletiva. Available from: www.tempus.unb.br/index.php/tempus/article/download/1039/948

7. BRASIL. Ministério da Saúde. Projeto SB Brasil 2010. Pesquisa Nacional de Saúde Bucal. Resultados Principais. Brasília, 2012.

8. Prefeitura Municipal de Piraí. Available from: https://www.pirai.rj.gov.br/servicos/saude/unidades-de-saude

9. IBGE - Instituto Brasileiro de Geografia e estatística. Estimativas populacionais para os municípios e para as Unidades da

Federação brasileiros. Available from: https://ww2.ibge.gov.br/home/estatistica/populacao/estimativa2015/default.shtm
10. Castro CES. A formulação lingüística da dor - versão brasileira do questionário McGill de Dor. São Carlos, 1999. [Dissertação de Mestrado – Universidade Federal de São Carlos].
11. Pinto RS, Matos DL, Loyola Filho AI. Characteristics associated with the use of dental services by the adult Brazilian population. Cien Saude Colet. 2012, 17: 532-544.
12. Lima CV, Souza JGS, Oliveira BEC, Noronha MS, Pereira AC, Probst LF. Falta de dentição funcional influencia na autopercepção da necessidade de tratamento em adultos: estudo de base populacional no Brasil. Cad. Saúde Colet., 2018, Rio de Janeiro, 26 (1): 63-69
13. Ferreira ABO. Pequeno dicionário brasileiro da língua portuguesa. 11ª ed. Rio de Janeiro: Editora Civilização Brasileira SA, 1987.
14. Fonseca SGO, Fonseca EP, Meneghim MC. Fatores associados ao uso de serviços odontológicos públicos por adultos no estado de São Paulo, Brasil, 2016. Ciência & Saúde Coletiva, [s.l.], jan. 2020;25(1):365-374,
15. Queiroz MF, Verli FD, Marinho AS, Paiva PCP, Santos SMC. Dor, ansiedade e qualidade de vida relacionada à saúde bucal de pacientes atendidos no serviço de urgência odontológica. Ciência & Saúde Coletiva, [s.l.], abr. 2019;24(4):1277-1286.
16. Rauch A, Hahnel S, Schierz O. Pain, Dental Fear, and Oral Health-related Quality of Life – Patients Seeking Care in an Emergency Dental Service in Germany. J Contemp Dent Pract 2019;20(1):3-7.
17. Freire MCM, Leles, CR Sardinha, LMV Junior, MP Malta, DC, Peres MA. Dor dentária e fatores associados em adolescentes brasileiros: a Pesquisa Nacional de Saúde do Escolar (PeNSE), Brasil, 2009. Cad. Saúde Pública, Rio de Janeiro,2012; 28 Sup:133-145
18. De Lacerda JT, De Bem Pereira M, Traebert J. Dental pain in Brazilian schoolchildren: a cross-sectional study. Int J Paediatr Dent. 2013,23:131-137
19. Brazil. Ministério da Saúde. Secretaria de Atenção à Saúde Departamento de Atenção Básica. CADERNOS DE ATENÇÃO BÁSICA - n.º 17. Brasília – DF. 2006
20. Scherer CI, Scherer MDA, Chaves SCL, Menezes ELC. O trabalho em saúde bucal na Estratégia Saúde da Família: uma difícil integração? Saúde Debate. 2018,42(2):233-256
21. Santos MLMF, Cruz SS, Gomes-Filho IS, Soares JSP, Figueiredo ACMG, Coelho CM. Satisfação dos usuários adultos com a atenção em saúde bucal na estratégia de saúde da família. Cadernos Saúde Coletiva, jun. 2015;23(2):163-171
22. Martins AMEBL, Ferreira RC, Neto PES, Carreiro DL, Souza JGS, Ferreira EF. Users' dissatisfaction with dental care: a population-based household study. Revista de Saúde Pública,2015;49:1-12
23. Bulgareli JV, Faria ET, Ambrosano GMB, Vazquez FL, Cortellazzi KL, Meneghim MC, et. al. Informações da atenção secundária em Odontologia para avaliação dos modelos de atenção à saúde. Rev Odontol UNESP. 2013,42(4):229-236
24. Brazil. Ministério da Saúde. Secretaria de Atenção à Saúde Departamento de Atenção Básica. CADERNOS DE ATENÇÃO BÁSICA - n.º 28, Volume I Brasília – DF 2011.

# AMELOBLASTIC FIBRODENTINOMA IN A BABY MAXILLA: CASE REPORT

Daniela Maria Carvalho **Pugliesi**[1]*, Camila Maria Beder **Ribeiro**[1], Valdeci Elias dos **Santos Junior**[1], Lisa Danielly Curcino **Araujo**[1], José Ricardo **Mikami**[2], Tamires Quicyane Sampaio **Araújo**[2], Luiza Eduardina Ferreira **Barros**[2]

[1]Dentistry College, Federal University of Alagoas, Maceió, AL, Brazil.
[2] Dentistry College, Centro Universitário Cesmac, Maceió, AL, Brazil.

**Palavras-chave**: Odontopediatria. Mucosa oral. Tumores odontogênicos.

**RESUMO**

**Introdução**: O Fibrodentinoma Ameloblástico (FDA) é um tumor odontogênico misto, raro, assintomático e de crescimento lento, acometendo normalmente crianças e jovens em sua primeira ou segunda década de vida. Essa lesão geralmente provoca expansão óssea da região envolvida e dificulta a erupção dentária. **Objetivo**: O objetivo deste trabalho é relatar um caso de FDA em maxila anterior de bebê de 3 anos de idade e seu tratamento, ressaltando a importância do atendimento odontológico precoce e o tratamento para este tipo de lesão. **Relato de caso**: Paciente do gênero feminino, 3 anos, compareceu à clínica odontológica de atendimento a bebês do Centro Universitário Cesmac (Maceió – AL, Brasil), acompanhada de sua mãe, relatando uma gengiva inchada há aproximadamente 6 meses. Ao exame clínico, observou-se um aumento de volume na região do incisivo central e lateral direito, com coloração discretamente avermelhada, superfície lisa, formato esférico, com inserção séssil, sem mobilidade e de consistência firme. Ao exame radiográfico constatou-se uma lesão mista com área radiolúcida compatível com reabsorção óssea e áreas radiopacas compatíveis com material calcificado no interior da lesão. Foi realizado uma biopsia incisional, confirmando o diagnóstico de Fibrodentinoma Ameloblástico. **Conclusão**: O tratamento desta anomalia requer uma abordagem precoce com o objetivo de melhorar a qualidade de vida desses pacientes, devendo-se aconselhar os pais ou responsáveis quanto à necessidade do acompanhamento periódico após a realização do tratamento.

**Keywords**: Pediatric Dentistry. Oral mucosa. Odontogenic Tumors.

**ABSTRACT**

**Introduction**: Ameloblastic fibrodentinoma (AFD) is a rare, asymptomatic, slow-growing mixed odontogenic tumor, usually affecting children and young people in their first or second decade of life. This lesion usually causes bone expansion of the involved region and makes tooth eruption difficult. **Objective**: the aim of this study is to report a case of AFD in the anterior maxilla of a 3-year-old baby and its treatment, highlighting the importance of early dental care and treatment for this type of injury. **Case report**: A 3-year-old female patient attended the dental care clinic at Cesmac University Center (Maceió- AL, Brazil), accompanied by her mother, reporting a swollen gum for approximately 6 months. Clinical examination revealed an increase in volume in the right central and lateral incisor region, discreetly reddish in color, smooth surface, spherical shape, sessile insertion, no mobility and firm consistency. Radiographic examination revealed a mixed lesion with radiolucent area compatible with bone resorption and radiopaque areas compatible with calcified material within the lesion. An incisional biopsy was performed, confirming the diagnosis of Ameloblastic Fibrodentinoma. **Conclusion**: Treating this anomaly requires an early approach to improve the quality of life of these patients. Parents or guardians should be advised of the need for periodic follow-up after treatment.

Submitted: July 4, 2019
Modification: October 14, 2019
Accepted: October 23, 2019

***Correspondence to:**
Daniela Maria Carvalho Pugliesi
Address: Av Lourival Melo Mota, S / N, the Martins Board, CEP: 57072-970, Maceió, AL, Brazil.
Telephone number: + 55 (82) 99993-9933
E-mail:dpugliesi@hotmail.com

## INTRODUCTION

During childhood, the oral cavity may develop several phenomena that contribute to establishing developmental alterations or pathogens.[1] The oral manifestations usually detected in pediatric dentistry are natal and neonatal teeth, Bohn's nodules, Epstein pearls, lamina cyst, cleft palate, micrognathia, tongue-associated alterations and several others.[2]

Odontogenic tumors are lesions derived from epithelial or mesenchymal tissues that are part of the complex process of odontogenesis and are histologically classified according to their origin in epithelial, mesenchymal or mixed. The etiology of these changes is related to disturbances in the development of teeth and associated structures.[3] Jaw bone tissue is the major region affected by these tumors, although some peripheral forms of these lesions are recognized. Odontogenic tumors are usually slow-growing and asymptomatic, and some of them have a predilection for specific age, gender and race.[3,4]

Ameloblastic fibrodentinoma (AFD) is a mixed odontogenic tumor composed of odontogenic epithelium and of odontogenic mesenchyme resembling dental papilla. This rare, asymptomatic, slow-growing tumor usually affects children and young people between the first and the second decades of life. It is usually diagnosed before the age of 20. It has a predilection for the posterior mandible (molars and premolars area) causing bone expansion and difficulties in tooth eruption of the involved teeth.[5,6] When AFD affects primary teeth, it is usually observed in the anterior region, mostly in incisors area6. Radiographically, it presents a uni or multilocular radiolucent lesion, with well-defined edges. Usually, the presence of amorphous radiopaque material is observed; linked to a badly positioned tooth, associated to a displaced tooth.[7]

Thus, the purpose of this study is to report a case of Ameloblastic Fibrodentinoma in the anterior maxilla of a 3-year-old baby and its treatment, highlighting the importance of early dental care and treatment for this type of injury.

## CASE REPORT

A 3-year-old female patient, melanoderma, attended the dental clinic at the Centro Universitário Cesmac, Maceió - AL, Brazil, accompanied by her mother; the girl's gums had been swollen for approximately 6 months. In the intra-oral physical examination, there was an increase in volume in the region of the central and right upper lateral incisors, which were poorly positioned. It had a slightly reddish coloration, smooth surface, spherical shape, with sessile insertion, fixed and firm consistency.

To verify if there was bone involvement, a maxillary occlusal x-ray with periapical film was performed. A mixed lesion was found with a radiolucent area compatible with bone resorption and radiopaque areas compatible with calcified material inside the lesion. The limits were not defined, there was dental displacement, mainly of tooth 51 and root resorption of teeth 51 and 52 involved in the lesion. An incisional biopsy was performed under local anesthesia with the aid of "punch" surgical cut for its accuracy and practicality. The material was sent to the laboratory of oral pathology of the Centro Universitário Cesmac, hypothesizing the diagnosis of calcifying odontogenic cyst, calcifying epithelial odontogenic tumor or central giant cell lesion.

The histological evaluation of specimens revealed proliferation of odontogenic epithelial bundles with columnar peripheral cells intermingled by a cellular myxoid stroma, resembling ameloblastic fibroma. Mineralized dentinoid material was observed in close relation to epithelial and mesenchymal cells leading to a final diagnosis or Ameloblastic fibrodentinoma. A microscopic consult was asked to the Piracicaba School of Dentistry of the State University of Campinas (Unicamp), which supported our diagnosis.

For a better visualization of the lesion and surgery planning, a cone beam CT scan was performed, two weeks after the incisional biopsy. The tomographic images allowed observing that the lesions showed higher volumetric increase on the buccal side and delimited with size 21.76 mm (height) x 22, 18mm (width) and 13.69mm (depth), and with calcified areas inside (Figure 1).

The removal of the lesion was performed under general anesthesia with orotracheal intubation. After the incision with a trapezoid shape and flap displacement, the lesion was exposed and enucleated with complete removal and without rupture, using a Molt curette, and a good cleavage plane was observed, which favored the enucleation. The removal of the lesion showed tooth 53 was committed, and we decided to extract it. The cavity was cared for, with curettage to prevent the lesion from remaining, the regulation of bone protrusions with bone file, and irrigation with saline 0.9%, leaving a cavity of about 20x15 mm. We also decided for superior labial frenectomy, followed by suture with resorbable polyglactin 910 4-0. In the macroscopic aspect of the surgical specimen, the lesion could be observed to comprise teeth 51 and 52, presenting a fibrous capsule, and calcified structures were found within it

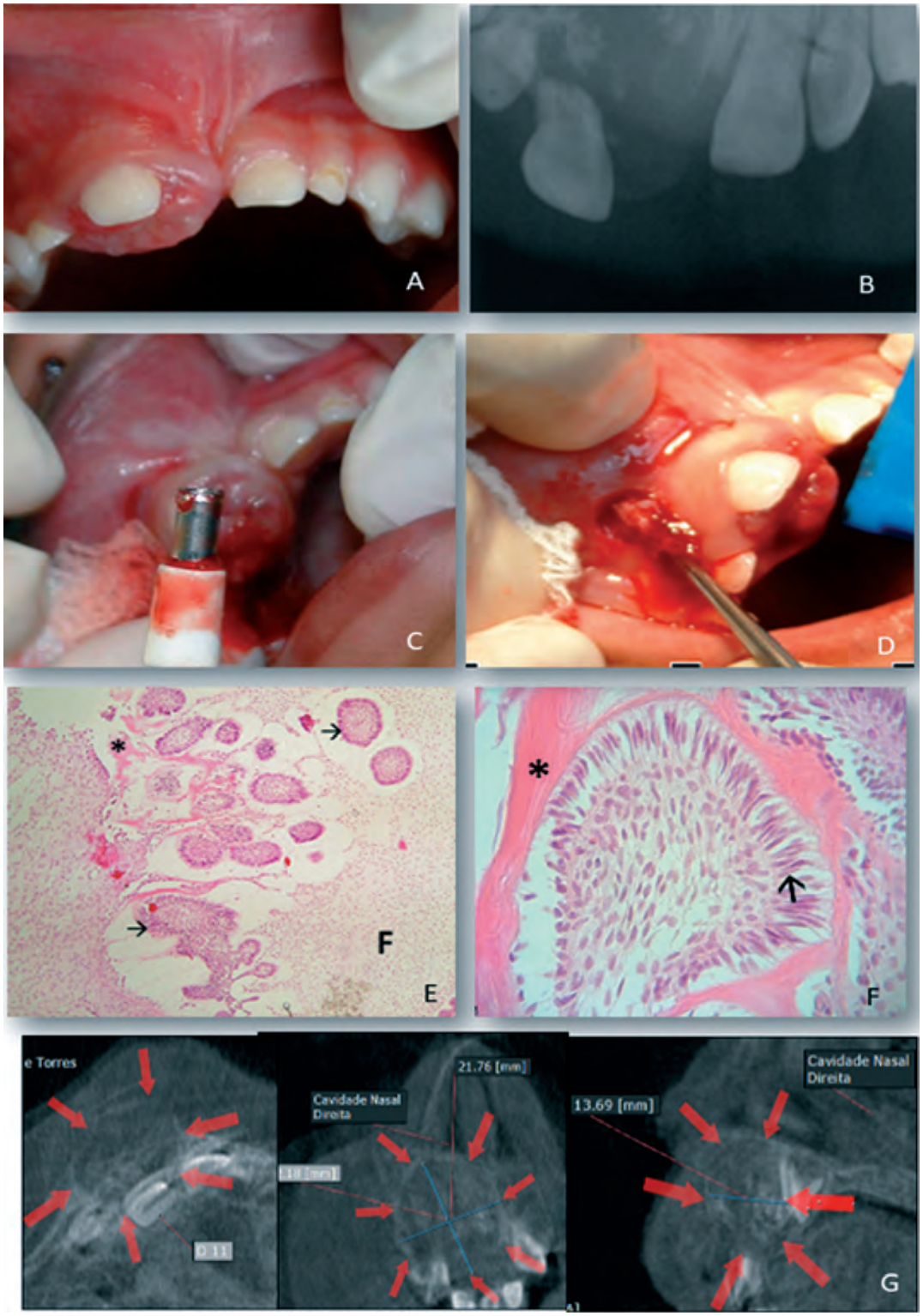


***Figure1**:(A) Initial intraoral aspect in an occlusal view: tooth 51 with vestibular displacement associated with a volumetric increase mainly by palatine, (B) Occlusal radiography of the maxilla with periapical film: radiopaque areas compatible with calcified material inside the lesion. (C) Surgical "punch" used to aid biopsy (D) Incisional biopsy: removal of material from the buccal region of maxillary volumetric enlargement, (E) Photomicroscopy of histological section: histological sections show epithelial (->) bundles permeated by mineralized component (*) resting amidst richly cellular myxoid stroma (f) (HE 40x), (F) Photomicroscopy of histological section: epithelial bundles (*) (HE 400x and (G)) Computed tomography: a - axial cut - lesion with anterior expansion with destruction of part of the cortical vestibular, but preserving the germs of teeth 11, 12 and 13 b - coronal cut - displacement of the floor of the nasal fossa, but without rupture of the cortical bone, c - sagittal cut - calcified areas inside the lesion (red arrows) and little expansion in the palatal region*

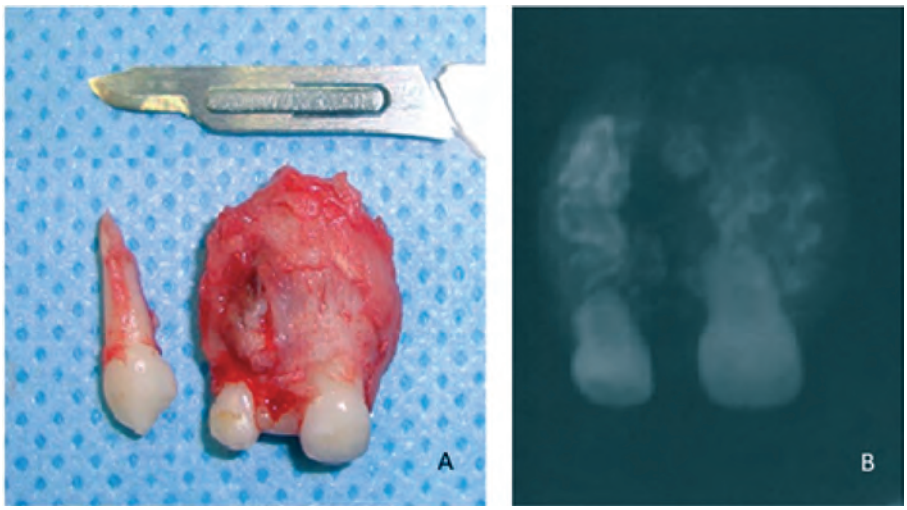


***Figure 2**: (A and B) teeth 53 compromised by the lesion, 51 and 52 associated with the lesion and periapical radiograph of the lesion: radiopaque areas relative to calcified material.*

A normal healing process was observed in clinical follow up 15 days after surgery. Pain or feeding difficulties were not reported by the patient. Radiographically, a radiolucent area compatible with the remaining bone cavity at the lesion site was observed and the germs of teeth 11, 12 and 13 were preserved (Figure 3). The patient is under strict clinical and radiographic follow up and had no recurrences.

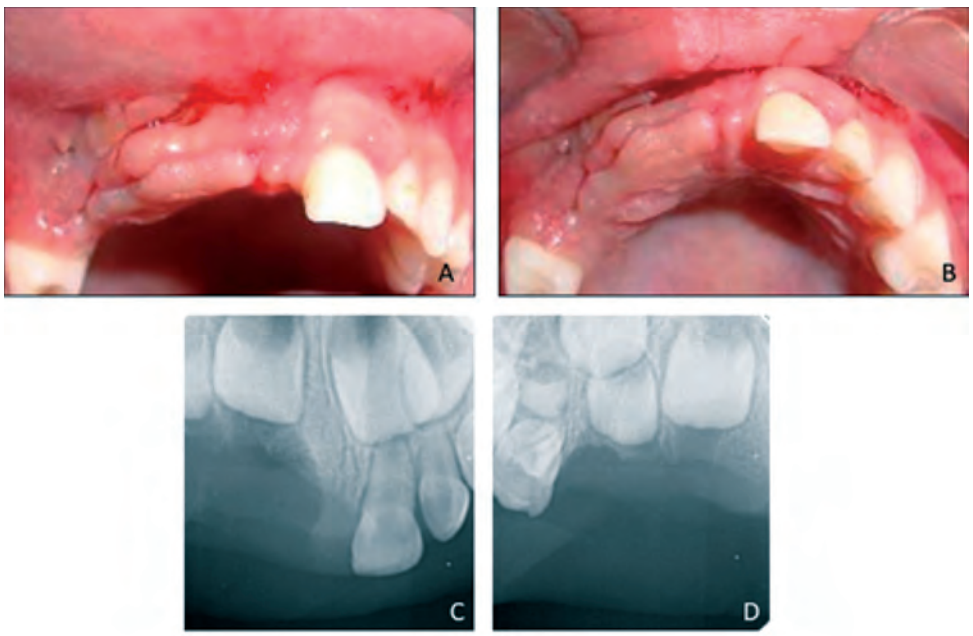


***Figure 3**: (A and B) Intraoral appearance after 15 days in an occlusal view: adequate maxillary arch contour and absence of teeth 51, 52 and 53 extracted in surgery, (C and D) Periapical radiographs after 15 days: compatible radiolucent area with the remaining cavity of the lesion. Germs of teeth 11,12 and 13 preserved.*

## DISCUSSION

Ameloblastic Fibroma (AF) is indicated as a true mixed tumor, presenting neoplastic epithelial and mesenchymal tissues. Integrated by odontogenic ectomesenchima, which looks like a dental papilla, with epithelial bundles that resemble dental lamina and enamel organ. Ameloblastic Fibro-odontoma (AFO) is an uncommon benign odontogenic tumor, which has in its composition dentin and enamel, ameloblastic fibroma structures like. [2,4]

AF and AFD are considered mixed odontogenic tumors, composed of epithelial cells and ectomesenchymal

neoplastic components. According to WHO (2017), in the latest book of classification of head and neck tumors in the section of ameloblastic fibroma, based on histopathological features, it is not possible to distinguish between AFs (true neoplasms) and early stage odontomas. However, rare AF show the formation of hard dental tissues and reach an exceptional size. These lesions have been referred to as ameloblastic fibrodentomas or ameloblastic fibroid odontomas, but are probably developing odontomas. Thus, due to the histopathological features presented in the case described, the descriptive diagnosis corroborated the WHO classification.[5] They are differentiated by the fact that AFDs exhibit dysplastic or tubular dentin material, while AFOs exhibit deposits of the enamel matrix, and ameloblastic fibromas have any type of hard tissue dental deposits.[6] Radiographically, a radiolucent image with definited limits of cystic appearance was observed, presenting radiopaque calcified material with tooth dislocation and resorption in relation to the involved tooth, as reported in the literature.[1,6,7,8]

The treatment of choice was enucleation with subsequent curettage, corroborating the works described in the literature.[1,6,9,10,11] The prognosis of the development of the permanent dentition of the patient in question is favorable for the future, since the preservation of tooth germs has been observed radiographically.[1,12,13,14] Also in this case, the upper lip frenectomy was performed due to the extension of the lesion, as seen clinically and in the imaging exams, with low lip frenum insertion, indicating the procedure in this case.[15]

The early discovery of changes in the oral cavity of infants is ctitically important and brings many benefits, since diagnosis at the initial stage of these lesions prevents future damage.

More data on the AFD need to be collected, in order to better understand the lesion, biological behavior, the threat of malignant transformation, as well as its relationship with other odontogenic lesions. However, treating this anomaly requires an early approach to improve the quality of life of these patients. The need for periodic follow-up after treatment has to be made clear to parents or guardians.

## REFERENCES

1. Sabu AM, Gandhi S, Singh I, Solanki M, Sakharia A. R.Ameloblastic Fibrodentinoma: A Rarity in Odontogenic Tumors. Journal of maxillofacial and oral surgery. 2018; 17(4): 444-448

2.Silva FWGP, Queiroz AM, Borsatto MC, Filho PN. Main odontogenic tumors that can affect the oral cavity of children. Dental Review of Universidade Cidade de São Paulo.2007; 19 (2): 181-187.

3. Chrcanovic, BR, Gomez RS. Ameloblastic fibrodentinoma and ameloblastic fibro-odontoma: an updated systematic review of cases reported in the literature. Journal of Oral and Maxillofacial Surgery. 2017; 75(7): 1425-1437.

4.Neville BW, Damm DD, Allen CM, Bouquot JE.Patologia oral and maxillofacial.2ª ed.Rio de Janeiro-RJ: Guanabara; 2008. Odontogenic Cysts and Tumors; p 580-582;601-604.

5.Chan JKC, El-Naggar AK, Grandis JR, Takata T, Slootweg PJ. WHO Classification of Head and Neck Tumours. World Health Organization, 4th edition; 2017.

6. Molina RB, Rodríguez SS, Borella AMB, Burciaga RGC, Repetto GT, Frechero NM. A histopathological and Immunohistochemical analysis of ameloblastic fibrodentinoma.a case report.Hindawi Publishing Corporation.2013: 1-7.

7.Cassidy JP, Crocker DJ, Grade WH. Ameloblastic fibrodentinoma. J Oral Maxillofac Surg.1987; 45 (8): 734-736.

8.Fernández RL, Rodríguez JT, Molina RB. Ameloblastic fibrodentinoma in a pediatric patient: presentation of a case.Revista Odontológica Mexicana.2009; 13 (1): 43-46.

9.Napier SS, Devine JC, Rennie JS, Lamey PJ.Unusual leiomyomatous hamartoma of hard palate: a case report. Oral Surg Oral Med Oral Pathol Oral Radiol Endod.1996; 82 (3): 305-307.

10.Brandt SK, Mason MH, Barkley R.Ameloblastic fibrodentinoma: report of case.ASDC J Dent Child.1988; 55 (5): 372-375.

11. Kaur V, Tilakraj TN. Peripheral ameloblastic fibrodentinoma in a 3-year-old boy: Report of an unusual and rare case. J Oral Maxillofac Pathol. 2018 Jan-Apr;22(1):112-115.

12.Akal UK, Gunhan O, Guler M.Ameloblastic fibrodentinoma.Report of two cases.Int J Oral Maxillofac Surg.1997; 26 (6): 455-457.

13.Ulmansky M, Bodner L, Praetorius F, Lustmann J. Ameloblastic fibrodentinoma: report on two new cases.J Oral Maxillofac Surg.1994; 52 (9): 980-984.

14.Sankireddy S, Kaushik A, Krishna BA, Reddy AG, Vinod VC, Sridevi V. Ameloblastic fibrodentinoma involving anterior maxilla: A rare case report. J Indian Soc Pedod Prev Dent 2013; 31: 275 -8..

15.Delli K, Livas C, Sculean A, Katsaros C,Bornstein MM.Facts and myths regarding the maxillary midline frenum and its treatment: a systematic review of the literature.Quintessence international. 2013;44(2): 177-187.

# INTEGRATED TREATMENT BETWEEN ORTHODONTICS AND PEDIATRIC DENTISTRY USING THE ULECTOMY TECHNIQUE: CASE REPORT

João Victor Frazão **Câmara**[1*], Flávio de Mendonça **Copello**[1], Bárbara Pilla **Tavares**[1], Aline Borburema **Neves**[1], Antônio Carlos de Oliveira **Ruellas**[1], Andréa Vaz Braga **Pintor**[1]

[1]Department of Pediatric Dentistry and Orthodontics, School of Dentistry, Federal University of Rio de Janeiro, RJ, Brazil.

**Palavras-chave:** Dente Impactado. Ulectomia. Odontopediatria. Ortodontia.

**RESUMO**

**Introdução:** Eventualmente na clínica odontológica, pode ser observada a impacção de dentes, que pode acarretar transtornos para o desenvolvimento da oclusão. **Objetivo:** Objetivou-se relatar um caso clínico no qual a técnica cirúrgica de ulectomia foi utilizada, associada ao tratamento ortodôntico para auxiliar a erupção dentária de um incisivo central superior. **Relato de Caso:** Paciente do sexo masculino, 13 anos de idade, Classe I de Angle na fase de dentição mista, com dente 21 incluso e espaço reduzido para sua erupção em função da migração dos dentes adjacentes. Foi montado aparelho fixo com bráquetes prescrição Edgewise, utilizando arco 0,20" aço inoxidável com ômega justo e mola ativa entre os dentes 11 e 22 para recuperação do espaço do 21, mas não observou-se a erupção passiva. Constatou-se presença de tecido gengival fibroso que, ao toque, evidenciava a borda incisal do referido dente. O paciente foi encaminhado para clínica de Odontopediatria para a realização da ulectomia. O procedimento cirúrgico minimamente invasivo, consistiu na exérese do tecido gengival que revestia a coroa do dente 21 não irrompido, permitindo sua erupção no arco dentário. Após a cirurgia, o dente irrompeu e o tratamento ortodôntico corretivo prosseguiu. **Conclusão:** A técnica da ulectomia associada ao tratamento ortodôntico permitiu restabelecer condições para desenvolvimento da dentição com características estético-funcionais satisfatórias.

**Keywords:** Impacted tooth. Ulectomy. Pediatric dentistry. Orthodontics.

**ABSTRACT**

**Introduction:** In the pediatric dental clinic the impacted teeth can be observed eventually, which can lead to the development of occlusion disorders. **Objective:** This study aimed to report a clinical case in which the surgical technique of ulectomy was used in conjunction with orthodontic treatment to aid the eruption of a maxillary central incisor. **Case Report:** Male patient, 13 years old, Angle Class I in the mixed dentition stage, with the tooth 21 impacted and reduced space for its eruption due to the migration of adjacent teeth. Fixed appliance was mounted with Edgewise brackets using 0.20" stainless steel archwire with tight omega and active spring between teeth 11 and 22 to recover the space of 21, but the passive eruption was not observed. A fibrous gingival tissue was found, which by palpation revealed the incisal edge of the tooth 21. The patient was referred to a pediatric dental clinic for a ulectomy. The minimally invasive surgical procedure consisted of the excision of the gingival tissue that covered the crown of the tooth 21 allowing its eruption in the dental arch. After the surgery, the teeth erupted and corrective orthodontic treatment continued. **Conclusion:** The ulectomy technique associated with orthodontic treatment allowed to reestablish conditions for the development of dentition with satisfactory aesthetic and functional characteristics.

Submitted: October 8, 2019
Modification: November 25, 2019
Accepted: December 3, 2019

***Correspondence to:**
João Victor Frazão Câmara
Address: Alameda Doutor Octávio Pinheiro Brisolla, 6-65, Jardim Brasil, Bauru - São Paulo – Brazil. - Zip code 17012-059.
Telephone number: +55 (21)98384-4255
Email: jvfrazao92@hotmail.com

## INTRODUCTION

In the pediatric dental clinic during the monitoring of the developing dentition, alterations in the pattern of eruption may result in tooth inclusion or impaction that can lead to disorders to the normal development of occlusion.[1,2] Included or unerupted tooth occurs due to a failure during the eruption process in relation to the chronology of eruption expected for the population, although its development is normal. Likewise, tooth impaction refers to the condition when the tooth is prevented from erupting by a mechanical barrier.[3]

In addition, it is essential to have space in the dental arch for proper positioning of the impacted tooth. Based on these considerations, the treatment can include the extraction of impacted tooth[4] in unfavorable cases or surgical exposure and assisted eruption in cases with good prognosis[5] or supervision in cases of systemically compromised patients.[6] The surgical procedure consists of the excision of the tissue that covers the incisal or occlusal face of permanent or deciduous teeth in order to allow eruption in the dental arch. Detailed clinical and radiographic examinations of the area are necessary for a correct indication of this surgical technique.[7,8] The ulectomy is indicated for cases in which there is gingival fibrosis with no remnant of bone tissue on the incisal or occlusal face of the impacted tooth.[9]

This study aims to present a clinical case in which the surgical technique of ulectomy associated with orthodontic treatment used for the assisted eruption of an impacted maxillary left central incisor in a young patient, avoiding major changes in occlusion.

## CASE REPORT

A 13-year-old male patient came to the Orthodontics Clinic of the School of Dentistry of the Federal University of Rio de Janeiro for a first appointment presenting as chief complaint the lack of eruption of the left maxillary central incisor. The patient had no general health issues and had not sought dental treatment to solve the eruption problem of the tooth 21, until the current dental appointment. It was observed by anamnesis and clinical examination that the patient was at the mixed dentition period, presenting: Angle Class I malocclusion, a 3.5 mm overjet, a 40% overbite, upper dental midline was shifted 2.5mm to the left, a slightly convex profile and nasal-oral breathing (Figure 1).

Patient's parents reported that he was previously referred to the extraction of a supernumerary tooth in the region of the tooth 21. At the intraoral clinical examination, it was verified that the tooth 21 was not present and was possibly impacted due to the previous supernumerary in that area and also due to the migration of the adjacent teeth, resulting in a lack of space in the arch perimeter. (Figure 2).

The periapical radiographic examination of the area was performed in order to complement the clinical diagnosis. The root of the tooth 21 presented more than 2/3 of formation (stage 8 of Nolla's classification) with the crown covered only by mucous tissue, without bone remnants. The roots of teeth 21 and 22 show slight distal curvature. Thus, the suggested treatment option was space opening (with braces, archwire and coil spring) to allows spontaneous eruption of element 21, considering the possibility of a ulectomy procedure, if the passive eruption did not occur.

The standard edgewise brackets (Morelli, São Paulo, Brazil) were bonded to the upper arch only: cemented bands (American Orthodontics, Sheboyan, USA) with convertible tube accessory (Morelli, São Paulo, Brazil). The brackets were bonded on the teeth 12, 11 and 22. For the space opening, it was used biomechanics with compressed open coil spring (Morelli, São Paulo, Brazil) in the region between elements 11 and 22 in a 0.20" passive stainless steel archwire" with flush omegas tied to the tube. A protective tube (Morelli, São Paulo, Brazil) was used in regions where there were no accessories attached. The space had been opened in approximately two months, but there was no spontaneous eruption of element 21, as also seen in periapical radiography (Figure 3 A and 3B).

Then, the patient was referred to the Pediatric Dental Clinic of the Federal University of Rio de Janeiro for the ulectomy procedure.

After the antisepsis of the oral cavity with 0.12% chlorhexidine digluconate (Periogard™, Colgate Palmolive, São Paulo, Brazil), topical anesthetic Benzotop (Nova DFL, Rio de Janeiro, Brazil) was used followed by infiltration anesthesia (Figure 3C) with a 2% Lidocaine anesthetic cartridgewith Adrenaline 1: 100,000 (Alphacaine, Nova DFL, Rio de Janeiro, Brazil) with complementation on the area of the incisal edge covered by the mucous tissue and intrapapillary anesthesia in the area of the tooth 21 (Figure 3D).

With the aid of a n° 15 scalpel blade (Unoject, Rio de Janeiro, Brazil), an elliptical incision, in the mesiodistal direction, was performed around the gingival mucosa to be removed (Figure 3E) aiming to the exposure of the incisal edge of the tooth by the tissue excision (Figures 3F and 3G).

Neither surgical cement placement nor postoperative medication were necessary. Hemostasis was performed with sterile gauze and saline solution.

After 14 days the patient was evaluated showing a complete healing of the region and a good evolution with evidenced spontaneous tooth eruption (Figure 4A). The patient proceeded to the comprehensive orthodontic treatment without extractions due to the good profile and small arch discrepancy (Figure 4B).

***Figure 1**: Extraoral photographs of the patient.*

***Figure 2**: Intraoral photographs of the patient, evidencing the space closure in the region of the tooth 21.*

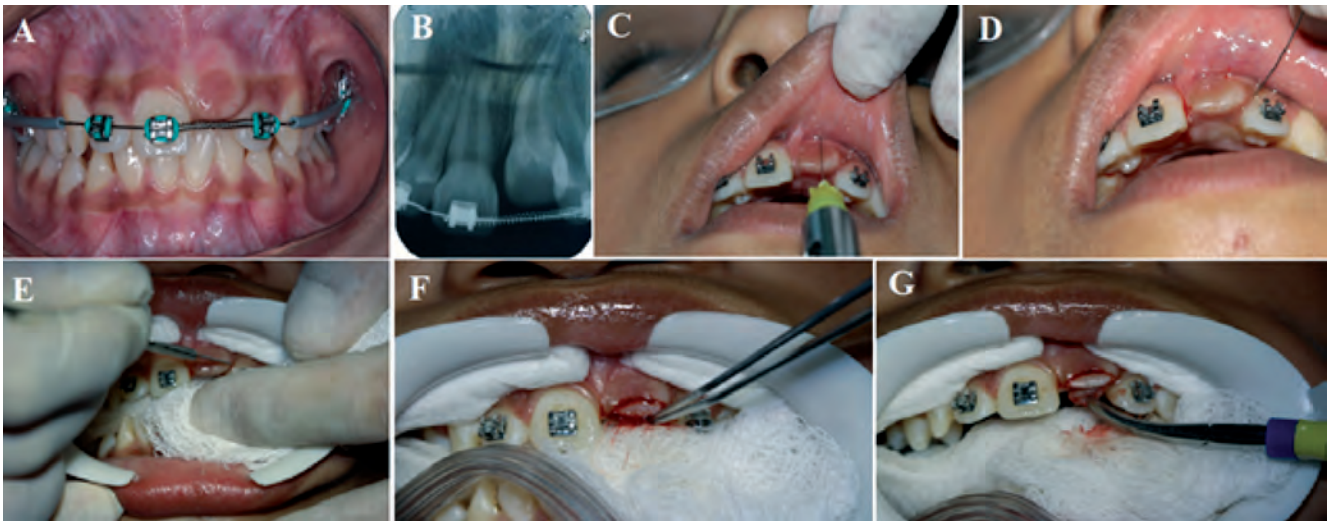


***Figure 3**: A) Fixed orthodontic appliance in place and final appearance after space opening. B) Periapical radiographic. C) Local infiltration anesthesia. D) Intrapapillary anesthesia. E) Elliptical incision of the gingival tissue. F) Excision of the gingival tissue. G) Removal of the tissue and exposure of the incisal edge.*

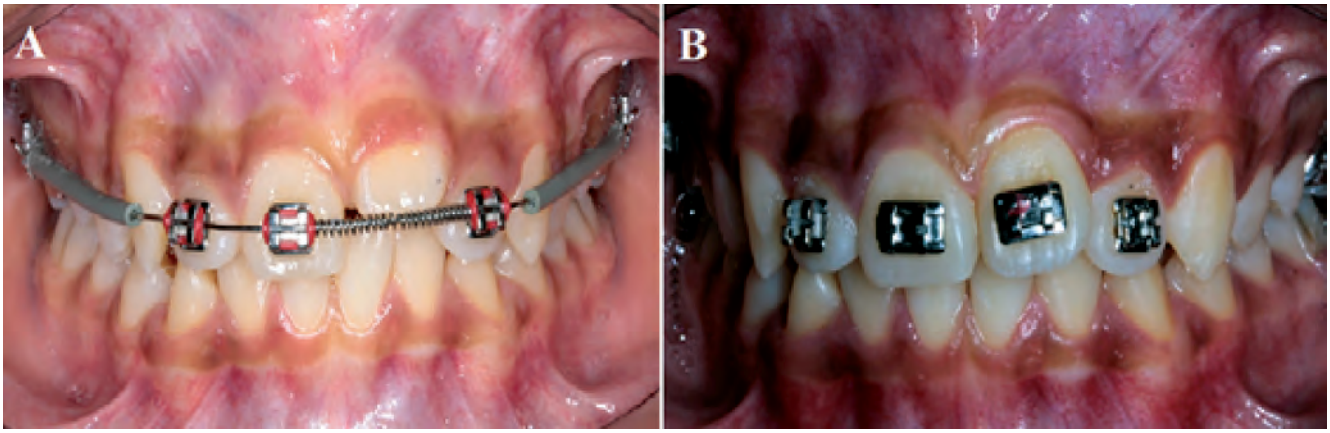


***Figure 4**: A) Frontal view, at 14 days follow-up; B) Frontal view, clinical aspect after 2 months (comprehensive orthodontic treatment will be performed).*

## DISCUSSION

During monitoring of the teeth eruption in the stages of deciduous, mixed and permanent dentitions the chronology of eruption is one of the factors to be observed in the search for a physiological normal occlusion. A malocclusion may occur as a result of changes in the pattern of eruption.

Therefore, when there is absence of a tooth or delay in its eruption, the etiology should carefully be investigated in order to plan the beginning and type of treatment. Dental agenesis and delayed eruption are similar clinical signs, thus making the differential diagnosis extremely necessary.[5] However, the imminent presence of an impacted tooth was evidenced by signs such as increased volume and contoured marks in the tissue,[5] as observed at the present report (Figure 3).

Considering the treatment of an impacted tooth by surgical exposure and assisted eruption, Koch et al.[10] stated that if the eruption of a tooth is paralyzed it is recommended he removal of any barrier at least when the root of the tooth is formed in 2/3 of its extension.[10] Since, if the ulectomy is postponed there is a risk of bending the root apex and the closure of space through the inclination of adjacent teeth, resulting in the need of subsequent orthodontic treatment for space opening.[9,10] In this sense, as soon as the space for the impacted tooth was obtained, the ulectomy was performed.

In the present case report there was evidence of tooth dilaceration. The presence of bone layer, agenesis and degree of reduced root formation are factors that contraindicate the ulectomy procedure. However, the previous report of a supernumerary tooth, in the region of the impacted tooth, may have been associated as a relevant condition for the delayed tooth eruption observed.[11-14]

The surgical technique of the ulectomy is configured by elliptical, circular or oval incisions that delimit the area for tissue excision. Its extension should allow exposure of the incisal edge or occlusal face of the tooth. Scalpel and blade, as described, laser or electrocautery may be used.[15] The surgery involved only the gingival tissue and the postoperative was great, since the patient did not complain of pain and tooth eruption was well-succeed.

In addition, achieving the tooth positioning in function at the arch, improves the esthetics and social relationships. The period of dental exchange is delicate, since in pre-adolescence and childhood most of the psychosocial and emotional development occurs. Thus, a tooth that has its eruption chronology altered can generate a negative repercussion in the development and life of the child.[16]

The interception of malocclusions at the proper time avoids the worsening of the malocclusion and may avoid the need for extractions of permanent teeth in the future.The interceptive management of the impacted tooth by the space opening and ulectomy interventions was effective.

## CONCLUSION

The technique of ulectomy associated with orthodontic procedure is shown as a necessary and effective surgical and therapeutic option for situations of delayed tooth eruption with impacted teeth, showing favorable results for the development of occlusion of the patient.

## REFERENCES

1) Lascala NT, Lascala Júnior NT. Aspectos cirúrgicos na prevenção – frenectomia, bridectomia e ulectomia. In. LASCALA, N. T. Prevenção na clínica odontológica: Promoção de saúde bucal. São Paulo: Artes Médicas, p. 209-220, 1997.

2) McDonald RE, Dean JA. Odontopediatria para crianças e adolescentes. 9ª ed. Rio de Janeiro: Elsevier Editora Ltda. 2011.

3) Health Sciences Descriptors: DeCS [Internet]. 2017 ed. São

Paulo (SP): BIREME / PAHO / WHO. 2017 [updated 2017 May 18; cited 2017 Jun 13]. Available from: http://decs.bvsalud.org/I/homepagei.htm.

4) Varvara G, Bernardi S, Piattelli M, CutilliT.Rare and life-threatening complication after an attempted lower third molar extraction: Lemierre syndrome. Ann R Coll Surg Engl. 2018;(29):1-3.

5) Candeiro GTM, Correia FC,Candeiro SALM. Ulectomia como opção cirúrgica no retardo da erupção dentária: relato de caso. Revista Odontológica de Araçatuba. 2009;(30)2:45-49.

6) Giugliani R, Villarreal ML, Valdez CA, Hawilou AM, Guelbert N, Garzón LN, Martins AM, Acosta A, Cabello JF, Lemes A, Santos ML, Amartino H. Guidelines for diagnosis and treatment of Hunter Syndrome for clinicians in Latin America. Genet Mol Biol. 2014;37(2):315-29.

7) Carreira MA, Pacenko MR, Matsumoto MA, Dekon AFC. Cisto de erupção e resolução cirúrgica por ulectomia: caso clínico. J Appl Oral Sci. 2003;11(3):234.

8) Gregori C, Motta LFG. Cirurgia em odontologia. In: Guedes–Pinto AC. Odontopediatria. 7ª ed. São Paulo: Santos;2003.

9) Issao M, Guedes-Pinto AC. Manual de odontopediatria. 10ª ed. São Paulo: Pancast. 1999.

10) Koch G, Modeér T,Pousen S, Rasmussen P. Odontopediatria: Uma abordagem clínica. In: Patologia bucal e cirurgia. 2ª Ed. São Paulo: Santos; 1995.

11) American Academy of Pediatric Dentistry. Management of the Developing Dentition and Occlusion in Pediatric Dentistry. Reference Manual. 2018;40(6):352-365.

12) Cavalcante AL, Paiva LCA. Utilização da ulectomia na clínica infantil: relato de caso. Ciências Biológicas e da Saúde. 2006;12(3):39-42.

13) Arnaud RR, Santos MGC, Valença AMG, Forte FDS, Lima KJRS, Beltrão RTS. Ulotomia: coadjuvante do tratamento da má oclusão. Revista da Faculdade de Odontologia, Passo Fundo. 2014;19(2):234-238.

14) Vantine FF, Carvalho PL, Candelária FLA. Estudo dos fatores que alteram a cronologia de erupção dentária. Revista Virtual de Odontologia. 2007;1(3):18-23.

15) Stuani AS, Souza AHF, Stuani AS, Stuani MBS. Solução alternativa para incisivo superior impactado. Revista Íbero-americana de Odontopediatria e Odontologia de Bebê. 2004;7(38):335-340.

16) Poricelli E, Ponzoni D. Cirurgia bucal pediátrica. In: Toledo OA. Odontopediatria: Fundamentos para a prática clínica. 3ª ed. São Paulo: Premier; 2005.

# Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal) | Instructions to authors

The Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal), a periodical published quarterly aiming at divulging and promoting scientific production and interchange of information between the Brazilian and International community in the different areas of Dentistry and other fields of Health Care. The entire content of the Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal) is available on the following web site http://revcientifica.cro-rj.org.br, to which there is free access. All the articles published in the Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal) have a publication license CC BY-NC-ND (http://creativecommons.org/licenses/by-nc-nd).

The Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal) publishes original articles, clinical case reports, protocols, reviews, letters to the editor and editorials/comments. Researches involving animals and/or human beings must be accompanied by the Certificate of Approval of a Research Ethics Committee. All articles are published in PDF format, in American English and must be submitted in this language. An abstract in Portuguese is demanded at the time of submitting and sending the final version.

**Peer Review Process**

All the content published by the Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal) goes through the process of review by specialists. Articles submitted for appreciation are sent to the CRO-RJ librarian, who, under the supervision of the Editors-in Chief, initially assesses them with regard to the minimum standards demanded relative to form of presentation in the Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal), with a view to complying with all the guidelines required for sending original articles. Once approved at this stage, the original is submitted for appreciation by the Editorial Board, to assess the merit of the work and decide about the convenience of publishing it, with or without changes. After this, the article is sent to undergo a process of evaluation carried out in the review system, by peers selected from a register of reviewers. The reviewers are always professionals from institutions different from that of the origin of the article; they are blind to the identity of the authors and place of origin of the work. After receiving both reports, the Editorial Council evaluates them, and decides about acceptance of the article without changes, rejection, or return to the authors with the suggestions about changes. The Editorial Board is responsible for returning the article to the authors for explanations, as many times as necessary, and at any time, the Editors may decide to reject the document. Each version is always analyzed by the Editorial Board that has the power of making the final decision.

**Types of Articles Published**

The Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal) accepts the spontaneous submission of original articles, clinical case reports, protocols, reviews, letter sot the editor and editorials/review comments, and letters to the editor.

**Original articles** include randomized and controlled studies; studies of diagnostic tests and triage; observational cohort, case control and cross-sectional studies; other descriptive and experimental studies, as well as those of basic research with laboratory animals. The text must have a maximum of 3.000 words, excluding tables and references; the number of references must not exceed 30. Articles that report clinical trials with therapeutic interventions must be registered in one of the Registers of Clinical Trials

listed by the World Health Organization. In the absence of a Latin American Register, the Revista do CRO-RJ (Rio de Janeiro Dental Journal) suggest that the authors use the following register www.clinicaltrials.gov, of the National Institute of Health (NIH). The Identification Number must be presented in the body of the manuscript. The submission of clinical trials must adhere to CONSORT checklist (http://www.consort-statement.org/). In cases of submission of observational studies, for preparation of the manuscript, adhesion to the STROBE guidelines is requested (https://www.strobe- statement.org/index.php?id=strobe-home).

**Clinical Case Reports** must not exceed 2000 words, including the abstract, brief introduction, description of the case, discussion, acknowledgments (if there are any). The figures may be organized in the form of a panel. Each panel will be considered a figure. The abstract must not exceed 250 words. Case report articles must be accompanied by the term of free and informed consent signed by the participant and/or his/her legal guardian. For preparation of the manuscript, authors must adhere to the guidelines suggested in CARE (http://www.care-statement.org).

**Protocols** aim to guide clinical practices in the different specialties of dentistry. Description: Structured Summary (150 words); introduction; step-by-step presentation of the adopted protocol with textual description and images/figures/tables; discussion, conclusions and references.

**Reviews** are critical and orderly assessments of the literature relative to topics of clinical importance, with emphasis on factors such as the causes and prevention of diseases, their diagnosis, treatment and prognosis. Systematic reviews and meta-analyses are included in this category. In the body of the manuscript of the latter two types of reviews, authors must include the Registration Number of the Review protocol in PROSPERO (http://www.crd.york.ac.uk/PROSPERO/). For preparation of the manuscript, authors must follow the guidelines proposed by PRISMA (http://www.prisma-statement.org/). Authors may also submit a proposal of a review article, with a script, to the Editorial Board. If this is approved the author may develop the script and submit it for publication. Review articles must be limited to 6.000 words, excluding references and tables.

**Letters to the editor** must contain comments with a constructive critical content about subject matter previously published in the Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal). These must be submitted directly to the Editorial Board. The maximum size is 1000 words, including a maximum of 10 bibliographic references. Whenever possible, a reply to the authors will be published together with the letter.

**Editorials and comments** are commissioned from authorities in specific areas. The Editorial Board may also analyze proposals of spontaneously submitted comments.

**General Guidelines**

The manuscript must be written using 12-point Arial font, on A4 size pages, with 1.5 line spacing, and a 3 cm margin on each side of the page, including the bibliographic references and titles/legends of tables and illustrations. The file must be presented in digital format, extension “doc” or “docx”. Each section must start on a new page, in the following order; title page, abstract in Portuguese, Abstract in English, text, acknowledgments, bibliographic references, tables (each complete table, with title and footnotes, on a separate page), figures (each complete figure, with titles and footnotes, on a separate page) and figure legends.

The following are the main guidelines about each section, according to the type of manuscript:

**Title Page**

The title page must contain all of the following items of information:

a) Title of the article, concise and informative, avoiding the use of superfluous terms and abbreviations; also avoid indicating the place and city where the study was conducted;

b) Abbreviated title (short title) to be stated at the top of all the pages with a maximum of 60 characters, counting the spaces;

c) The full name of each of the authors (first name and other surnames, with the last surname typed in bold-face font.

d) Department to which the authors are affiliated and/or definition of the institution or official service to which the study is tied;

e) Specific contribution of each author to the study;

f) Declaration of conflict of interest (write “nothing to declare” or a clear revelation of any interest of an economic or other nature that may cause embarrassment if it becomes known after publication of the article);

g) Name, address, telephone, fax and e-mail address of the corresponding author;

h) Source of financing or supplier of equipment and materials, if this were the case;

**ABSTRACT**

The abstracts (Portuguese and English) must contain a maximum of 250 words, avoiding the use of abbreviations. No words that identify the institution or city where the article was written must be put into the abstract, to facilitate blind reviewing. All the information that appears in the abstract must also appear in the article. The abstract must be structured according to the following description:

**Abstract of Original Article**

Introduction (optional): introduce the reader to the topic to be addressed in the article.

Aim: inform the initial hypotheses, if there are any. Define the main aim and inform only the most relevant secondary aims.

**Methods:** Inform the type of study design, contextual or local, the patients or participants (define the eligibility criteria, sample number, sample distribution criteria among groups, etc.), the interventions/ exposures (describe characteristics, including methods of application, variables analyzed, duration, etc.), and the criteria for measuring the outcome, including the statistical analysis.

**Results:** Inform the main data, confidence intervals and significance, the statistics of the findings.

**Conclusions:** Present only those supported by the data of the study, and that contemplate the aims, as well as their practical application with equal emphasis on the positive and negative findings that have similar scientific merits.

**Abstract of Case Reports**

**Introduction** (optional): inform the reader about the topic to be addressed.

**Aim**: briefly state the aims of the report.

**Case Report**: report the case itself.

**Results:** Inform the main data related to resolution of the case.

**Conclusions:** Present only those supported by the data of the study, and that contemplate the aims and their application.

**Abstract of Reviews**

Introduction (optional): briefly report the central topic of the review, and justify why it was conducted.

**Aim:** Inform the aim of the review, indicating whether it especially emphasizes some factor, risk, prevention, diagnosis, treatment or prognosis.

**Sources of data:** Describe the sources of the research, defining the databases and years researched. Briefly inform the eligibility criteria of articles and methods of extraction and evaluation of the quality of information (in cases of Systematic Reviews).

**Summary of data:** Inform the main results of the research, whether they are quantitative or qualitative.

**Conclusions:** Present the conclusions and their clinical application.

After the summary of the original articles, case reports or reviews, include three to six key-words that will be used for indexing. Use terms of Medical Subject Headings (MeSH), available in http:// www.nlm.nih.gov/mesh/ meshhome.html. When adequate descriptors are not available, it is possible to use free terms.

**Abstract of Protocols**

Inform the reader about the topic to be addressed and state the aim of the protocol.

**ABBREVIATIONS**

These must be avoided, because they hamper comfortable reading of the text. When used, they must be defined when they are used for the first time. They must never appear in the title and abstracts.

**TEXTS**

The text of **original articles** must contain the following sections, each with its respective sub-title:

**Introduction:** Clear, objective, succinct, citing only references strictly related to the topic, and seeking to justify why the study was conducted. At the end of the introduction, the aims of the study must be clearly described.

**Materials and Methods:** Describe the population studies, sample and eligibility criteria; clearly define the variables and detail the statistical analysis; if necessary, include references about the methods used during the course of this section. Procedures, products and items of equipment used must be described in sufficient detail to allow reproduction of the study. Furthermore, they must contain details of the brand and place of manufacture. In case of studies with human beings and/or animals, it is mandatory to include a declaration that all the procedures were approved by the research ethics committee of the institution to which the authors belong. In the absence of this, approval must be obtained from another research ethics committee indicated by the National Commission of Research Ethics of the Ministry of Health.

**Results:** These must be presented clearly, objectively and in a logical sequence. The information contained in tables or figures must not be repeated in the text. The option to use graphs instead of tables with a large number of data depends on the authors and Editorial Board, which may suggest changes and adjustments with the purpose of making them better suited to the guidelines and specificities of the Revista de Odontologia do CRO-RJ (Rio de Janeiro Dental Journal).

**Discussion:** This must interpret the results and compare them with data previously described in the literature, emphasizing the new and important aspects of the study. Discuss the implications of the findings and their limitations, as well as the need for additional researches. Avoid repetition of the results and/or superimposition between results and discussion. The conclusions must be presented at the end of the discussion, and must respond to the aims of the study, by avoiding information if inferences were not supported by the findings. The authors must place equal emphasis on favorable and unfavorable findings that have similar scientific merits. Include recommendations, when these are pertinent.

The text of **case reports** must contain the following sections, each with its respective sub-title:

**Introduction**: Clear, objective, succinct, citing only references strictly related to the topic, and seeking to justify why the study was conducted. Describe the aims at the end of the introduction.

**Case Report**: must present details of the case and procedures for performing them. Describe the follow-up data and prognosis of the case, when pertinent. CRO suggests that cases without due conclusion should be avoided. Mention the Term of Free and Informed Consent.

**Discussion:** Discuss the diagnostic, therapeutic and technical criteria used, among other details about the case. Discuss the clinical implications of the findings and their limitations. The conclusions must be presented at the end of the discussion, and must respond to the aims of the study, by avoiding information if inferences were not supported by the findings. The authors must place equal emphasis on favorable and unfavorable findings that have similar scientific merits. Include recommendations, when these are pertinent.

The text of **review articles** must contain the following topics: - In case of **narrative reviews**, the following are suggested:

**Introduction:** clear and objective, in which the authors explain the importance of the review to clinical practice, in the light of dental literature. The introduction must conclude with the aims of the review.

**Materials and Methods/Data Source:** It is necessary to describe the methods of data selection and extraction, followed by Data Synthesis.

**Data Synthesis:** This data synthesis (result/discussion) must present all the pertinent information in rich detail.

**Conclusion:** The conclusion section must correlate the main ideas of the review with the possible clinical applications, limiting generalization to the domains of the review.

- In cases of **systematic reviews, with or without meta-analyses**, the authors must follow the PRISMA statement (http://www.prisma-statement.org/). These reviews must contain: **Introduction**: that demonstrates the pertinence of the subject and the existent controversy with respect to the topic. At the end of the introduction, the authors should raise the focal question of the review. **Materials and Methods**: must present the search strategy; eligibility criteria of the studies; risk of bias analysis of the included studies; data extraction, and when pertinent, the strategy used for quantitative data synthesis.

**Result**: must respond in an orderly manner to the data searched according to the methodological design with respect to the qualitative and quantitative synthesis of the primary studies included.

**Discussion**: must consider interpreting the results, emphasizing resolution of the controversies related to the topic, with this being directed towards answering the focal question of the review, showing whether or not there is need for further research. The limitations of the study must also be pointed out and envisage the external validity of the study (power of generalization of the data).

**Conclusion:** The conclusion section must correlate the main ideas of the review with the possible clinical applications.

**Acknowledgments**

These must be brief and objective; they should only mention the person or institutions that made a significant contribution to the study, butthat had not fulfilled the criteria of authorship.

**References**

The references must be formatted in the Vancouver style, also known as the Uniform Requirements style.

The bibliographic references must be numbered and ordered according to the order in which they appear in the text, in which they must be identified by the respective superscript Arabic numbers. To list the references, do not use the Word resource of end notes or footnotes.

Articles accepted for publication, but not yet published, may be cited provided that the name of the journal is indicated and that it is "in press". Unpublished observations and personal communications may not be cited as references. If it were imperative to include information of this type in the article, it must be followed by the observation "unpublished data" or "personal communication" in parentheses in the body of the article.

The titles of periodicals must be abbreviated as recommended in the Medicus Index; a list with their respective abbreviations may be obtained by means of the publication NLM "List of Serials Indexed for Online Users", available at the address http:// www.nlm.nih.gov/tsd/serials/lsiou.html.

As follows, we present some examples of the model adopted by the Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal):

**Articles in periodicals:**

*1.* Up to six authors:

Vieira AR, Bayram M, Seymen F, Sencak RC, Lippert F, Modesto A. In Vitro Acid-Mediated Initial Dental Enamel Loss Is Associated with Genetic Variants Previously Linked to Caries Experience. Front Physiol. 2017 Feb 22;8:104. doi: 10.3389/fphys.2017.00104.

*2.* More than six authors:

da Silva Bastos Vde A, Freitas-Fernandes LB, Fidalgo TK, Martins C, Mattos CT, de Souza IP, et. al. Mother-to-child transmission of Streptococcus mutans: a systematic review and meta-analysis. J Dent. 2015 Feb;43(2):181-91. doi: 10.1016/j.jdent.2014.12.001.

*3.* Organization as author:

American Academy of Pediatrics. Clinical practice guideline. Diagnosis and management of childhood obstructive sleep apnea syndrome. Pediatrics 2012;130 (3):576-684.

*4.* Articles with electronic publication, not yet with printed publication:

Tavares Silva C, Calabrio IR, Serra-Negra JM, Fonseca- Gonçalves A, Maia LC. Knowledge of parents/guardians about nocturnal bruxism in children and adolescents. Cranio. 2016; Jun 24:1-5. [Epub ahead of print]

**Books:**

Andreasen JO, Andreasen FM. Textbook and color atlas of traumatic injuries to the teeth. 4ª ed. Copenhagen: Mosby. 2007.

Chapters of Books:

Pagel JF, Pegram GV. The role for the primary care physician in sleep medicine. In: Pagel JF, Pandi-Perumal SR, editors. Primary care sleep medicine. 2nd ed. New York: Springer; 2014.

Academic Studies:

BorkowskiMM. Infant sleep and feeding: a telephone survey of Hispanic Americans [dissertation]. MountPleasant(MI): Central Michigan University; 2002.

**CD-ROM:**

Soils. Geographica on CD ROM. [CD ROM]. Melbourne, Australia: Random House. 1999.

**Homepage/website:**

Integrative Medicine Center[Internet]. Houston: University of Texas, M. D. Anderson Cancer Center; c2017 [cited 2017 Mar 25]. Available from: https://www.mdanderson.org/patients- family/diagnosis-treatment/care-centers-clinics/integrative- medicine-center.html.

Ministry of Health Documents/Decrees and Laws:

1. Brazil. Decree 6.170, of July 25, 2007. States provisions about the rules relative to Transfers of resources from the Union by means of transfer agreements and contracts and makes other provisions. Diário Oficial, Brasília, 26 jul. 2007.

2. Brazil. Ministry of Health Health Care Secretary Department of Primary Care Política Nacional de Atenção Básica / Ministério da Saúde. Health Care Secretary Department of Primary Care Brasília, Ministério da Saúde, 2012. (Série E. Legislação em Saúde)

Presentation of Paper/Study?

Pierro VSS, Maia LC, Silva EM. Effect of pediatric syrups on roughness and erosion of enamel (abstract). 82nd. IADR General Session & Exhibition; 2004 Mar 10-13, Honolulu, Hawaii. J Dent Res 2004, 83 (Special Issue A): 896.

**Tables**

Each table must be presented on a separate page, numbered with a Arabic numeral (1, 2, 3, etc.), in the order of appearance in the text; with single spacing between lines, and contain a summarized but explanatory title. All the explanations must be presented in footnotes and not in the title, identified with superscript letters in alphabetical order. Do not underline or draw lines within the tables and do not use spaces to separate the columns. Do not use space on either side of the symbol ± or any other symbol.

**Figures (photographs, drawings, graphs, etc.)**

All the figures must be numbered with Arabic numerals (1, 2, 3, etc.), in order of appearance in the text. The title must be clear and objective, and must appear at the base of the Figure. All the explanations must be presented in the legends, including those about the abbreviations used. Figures reproduced from other previously published sources must indicate this condition in the legend, in addition to being accompanied by a letter of permission from the copyright holder. Photographs must not allow identification of the patient; masking the patient's eye region in the photograph may not provide sufficient protection. Should there be possibility of identification, it is mandatory to include a written term of free and informed consent to publication. Microphotographs must present internal scales and arrows in contrast with the background.

Illustrations in color are accepted for publication online, without additional cost to the authors. However, all the figures will be transformed to black and white in the printed version. If the authors consider it essential for a certain image to be in color, even in the printed version, the authors are requested to make special contact with the editors. Computer-generated images, such as graphs, must be attached in the form of files in the following formats: .jpg, .gif or .tif, with minimum resolution of 300 dpi. Graphs must preferably be presented in two dimensions. CRO will only accept

drawings, photographs or any illustrations that contain an adequate degree of resolution for the printed version of the journal.

**Figure Legends**

These must be presented on a separate page, duly identified with their respective numbers.

**Verification List**

As part of the submission process, authors are requested to indicate their agreement with the items listed as follows:

1. All the authors will sign and submit their agreement by means of a Copyright License Declaration (and end user license), and the content of their intellectual work will be their sole and exclusive responsibility.

2. The corresponding author must prepare, with the consent of the other authors, a letter of submission of the article to the Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal).

3. The submission file (manuscript) must be sent as a Microsoft Word document.

4. The title page must contain all the information required, as specified in the guidelines to the authors.

5. The abstract and key words must be formatted and submitted in English and Portuguese, following the title page.

6. The entire text must be presented in double line spacing using 12-point Arial font, and using italics instead of underlining to indicate emphasis (except in e-mail addresses. All the tables, figures and legends must be numbered in the order in which they appear in the text; each of these must be placed on a separate page, after the bibliographic references at the end of the article.

7. The text must be in accordance with the demands of style and bibliography described in the publication guidelines.

8. The references must be presented in the so-called Vancouver style, and numbered consecutively in the order in which they appear in the text.

9. Information about approval of the study by a research ethics committee must be clearly presented in the text, in the Methods section, and must be sent as an attachment.

10 All the internet addresses presented in the text must be active and ready to be clicked on.

11.Documentary proof of potential Conflict of Interest must be signed by all the authors and sent as an attachment during the submission process.

**Final Considerations:**

**Anti-Plagiarism Policy**

The Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal) uses a system to detect plagiarism (available at http//:www.plagium.com/pt/detectordeplagio). When submitting an article to the journal, the authors accept that the work will be digitized in the mentioned program at the time of submission, and in the case of acceptance, prior to publication.

**Ethics Policy of the Publication**

All submissions will be subject to the condition that the articles have not been previously published, and have also not been simultaneously submitted to another medium of disclosure. All the authors must have read and approved the content and all the authors have declared possible conflicts of interest. The article must follow the ethical principles

of the Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal), and they must also comply with the international standards of research ethics in studies with human beings and animals.

**Conflict of interest and financial aid**

The Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal) requires all authors to declare potential conflicts of interest. Any interest or relationship, financial or other type that may be perceived as having influenced the results of a study, and the objectivity of an author, is considered a potential source of conflict of interests, and must be declared. The potential sources of conflict of interest include, but are not limited to, rights arising from patent rights or ownership of shares, membership of a board of directors, membership of an advisory board or committee of a company, and receiving advice or speaking fees from a company. If the authors are not sure whether a past or present affiliation or relationship needs to be divulged in the manuscript, please contact the editorial office at http://revcientifica.cro-rj.org.br

The existence of conflict of interests does not exclude publication.

The corresponding author is responsible for ensuring that all the authors fulfill and sign the copyright license declaration and other mandatory documents at the time of submission.

**Confirmation of sending the documents**

After submission, the corresponding author will receive an e-mail to confirm receipt of the article. If this e-mail of confirmation is not received after 24 hours, please contact the Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal) by e-mail: revistacientifica@cro-rj.org.br. The error may have been caused by some type of spam filtering in the e-mail server.

**Updating the status of the article**

The initial process of evaluating the article may take up to 60 days, counted from the date of its submission. Should this period have expired, you may contact the Editorial Board to verify the present status. The Revista Científica do CRO-RJ (Rio de Janeiro Dental Journal) will inform you by e-mail, once a decision has been made. One of the following possibilities will be indicated in the reply e-mail: 1. Make adjustments to suit the guidelines and Re-submit; 2. Accepted; 3. Minor adjustments required; 4. Major adjustments required; 5. Rejected. In the latter case, the article will be summarily refused and cannot be re-submitted to the journal.

**Submission of Revised Articles**

The revised manuscripts must be sent within 2 months after notifying the authors about the conditional acceptance (minor or major adjustments). All the revisions must be accompanied by a letter of response to the reviewers, in which each question or suggestion made by the reviewers must be answered in sequential order. The letter must a) detail the author's reply, point by point, to each of the reviewers' comments, and b) a revised manuscript, highlighting in color, exactly what has been changed in the manuscript after revision. In addition to this, any need for adjustment or correction of the manuscript is the sole responsibility of the authors.

The authors must supply an official certificate of revision of the English language in the act of submitting the revised manuscript. The authors will be fully responsible for the costs of translation/revision of the English language.