

Dental Caries and Oral Health-related Quality of Life in Cleft Lip and Palate Patients: A Pilot Study

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ABSTRACT

Background: Dental caries is a chronic disease caused by a set of biological and social factors. The aim of this study was to conduct a study of dental caries and oral health related quality of life (QoL) in Brazilian patients with cleft lip and palate.

Materials and methods: A cross-sectional study was conducted with cleft lip and palate patients with 12 years of age. Participants were examined for dental caries decayed, missing and filled teeth-World Health Organization (DMFT-WHO criteria). The dental impact on daily living (DIDL) instrument was used to collect data of oral health-related QoL. The Mann-Whitney test was used to present the differences between gender and the Spearman correlation was used with DIDL and DMFT.

Results: The 30 (30%) of the 50 children with cleft lip and palate were caries-free, and the DMFT was 1.70 (1.62), with 53.91% for the care index. The dimensions 'Speak' (34%) and 'Hygiene' (46%) represented the largest negative impact on QoL. The DIDL instrument correlated only among the missing component and dimensions 'Stress' ($r = 0.35, p < 0.01$) and 'Study' ($r = 0.52, p < 0.01$).

Conclusion: The presence of cleft lip and palate in subjects 12 years of age had a negative impact on QoL and this impact was also significant for tooth loss caused by dental caries.

Keywords: Cleft lip, Cleft palate, Dental caries, Quality of life.

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INTRODUCTION

Dental caries is a chronic disease caused by a set of biological and social factors and is present in the lives of humans for hundreds of years.¹ With the advancement of this disease prevention knowledge, especially regarding widespread use of fluorides, it has been observed a decline in dental caries prevalence in countries around the world.²⁻⁴

Cleft lip and palate is a congenital anomaly that occurs by the absence of fusion of the maxillary and nasal processes during the formation of the human embryo, compromising the function and esthetics.⁵ These may involve the upper lip, the premaxilla region or extend to the soft palate causing a communication between the nasal and oral cavities.⁶ This anomalous condition causes inconvenience to the patient regarding eating, breathing, swallowing and consequently the oral hygiene of the cleft lip and palate patients should be observed in a special way because of the need for difficult movements to biofilm disorganization on all enamel surfaces.⁷ These individuals need a good oral health condition to the course of cleft treatment itself to be well succeeded.^{8,9}

There is a need to monitor the incidence of dental caries in cleft lip and palate patients for the planning of dental care consistent with the epidemiological needs of these people, providing not only the surgical-restorative treatment of cleft itself but also the clinical and preventive-restorative treatment for dental caries control.¹⁰

The aim of this study was to conduct an epidemiological pilot survey of dental caries and oral health-related quality of life (QoL) in Brazilian patients with cleft lip and palate who seek treatment at a Tertiary Craniofacial Center. The analysis of these results will help the hospital staff of pediatric dentists to improve a policy for oral healthcare of these patients with focus on QoL.

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MATERIALS AND METHODS

Ethical Aspects

This project was submitted to the Ethics Committee on Human Research of a Tertiary Craniofacial Center, and approval for development (Process Platform Brazil 01912712.2.0000.5441), followed requirements and ethical recommendations of the Brazilian legislation.

Sample Composition

A pilot cross-sectional observational epidemiological study in 50 patients, as World Health Organization (WHO) recommends,¹¹ 12 years of age with cleft lip and palate, attended by the Tertiary Craniofacial Center. Participants were examined under codes and WHO criteria for dental caries decayed, missing and filled teeth (DMFT). Children were randomly selected systematically from those who possessed the term of consent signed by their parents.

Standardization of Examiner

Prior to this study, the examiner was calibrated with a standard examiner in order to obtain strong inter-rater agreement (Kappa statistics >0.80). For both codes and criteria were discussed with the presence of photographs of clinical cases. Secondly, practical activity of epidemiological examination for dental caries, WHO criteria for testing the methodology was carried out and to check the correlation between the standard examiner and the examiner of this research in two rounds of tests with five research subjects (Kappa statistics >0.80). Epidemiological examinations were performed by a single examiner in the main study. During data collection, 10% of the sample was reexamined for the observation of intra-examiner agreement (kappa statistics >0.80). All examinations were performed after brushing supervised by a research subject, who received guidance regarding their oral health status, treatment needs and preventive aspects related to dental caries. Epidemiological examinations for dental caries under criteria WHO²⁹ with the assistance of WHO probe and natural light, also known as CPI or ballpoint probe (Trinity, São Paulo, Brazil), and dental plan mirror number 5 (Pharmainox, Cachoeirinha, Rio Grande do Sul, Brazil).

Quality of Life Assessment

The dental impact on daily living (DIDL)^{12,13} instrument was used to collect data on the state of oral health-related QoL of the volunteers which were considered able to answer for themselves the questions offered. Participants answered questions based on events that occurred in the last 6 months before the epidemiologic exam. This

instrument consists of eight questions divided into eight dimensions: eating, speaking, dental hygiene, resting, smiling, stress, studying, have fun. For each question, the answer was given in Likert scale for frequency (never, rarely, regularly, almost always and always, with values ranging from zero to five, respectively) and severity of dental caries in the influence of specific size (ranging from one to five, with increasing values directly proportional to the intensity of negative impact). In each dimension, the frequency was multiplied by the severity, and the maximum possible score of 25 in each dimension. The formula to be applied to meet the overall value of this instrument is expressed as the sum of each dimension multiplied by 100 and divided by 200 (maximum possible value).

RESULTS

For sample evaluation, the examiner was calibrated with standard examiner, getting 83% of interrater agreement (kappa statistic) for five cases examined. Then children were selected to participate in the study according to the criteria of inclusion and exclusion. During the study, the repetition of tests was performed in 10% of cases, obtaining 98% of intraexaminer agreement (Kappa statistics).

The sample of subjects 12 years of age with clefts is shown in Table 1, represented by 50 individuals with cleft lip and palate, 66% males and 44% with unilateral cleft lip were examined (Table 1).

Data regarding the prevalence of dental caries are presented in Table 2. The DMFT group was 1.70 and the largest representation was the filled component (DF) with 72.95%, followed by the decayed component (DC) with 23.53%. The caries-free group was represented by 30.30% and the top third of the distribution of the DMFT index (Significance of dental caries—SiC Index) index gained 3.69 average (Table 2).

The psychosocial perception of QoL achieved through the DIDL instrument is presented in Table 3, along with the Cronbach Alpha Coefficient. The dimensions 'Speak' (34%) and 'Hygiene' (46%) represented the largest negative impact reported by the volunteers and the dimensions that caused less negative impact was 'Resting', 'Studying' and 'Having Fun' (Table 3).

Table 1: Individuals 12 years of age examined at HRAC-USP, according to sex and types of clefts

Sex	Types of clefts*				Total
	A	B	C	D	
Males	7	8	14	4	33
Females	5	2	8	2	17
Total	12	10	22	6	50

*A: Cleft palate, incomplete; B: Transforamen cleft lip and palate, bilateral complete; C: Cleft lip, unilateral complete; D: Cleft lip, bilateral incomplete



Table 2: Decayed, missing and filled teeth index and its components* in children 12 years of age with clefts

Sex	DC	DF	DFC	DM	DMFT	Caries free	Care index	SiC index
Males	0.36 (0.90)	1.03 (1.26)	0.03 (0.17)	0.00 (0.00)	1.42 (1.35)	10 (30.30%)	50.42%	3.10 (0.88)
Females	0.47 (1.07)	1.65 (1.69)	0.00 (0.00)	0.12 (0.49)	2.24 (1.99)	3 (17.65%)	60.78%	4.80 (1.10)
Total	0.40 (0.95)	1.24 (1.44)	0.02 (0.14)	0.04 (0.28)	1.70 (1.62)	13 (26.00%)	53.91%	3.69 (1.14)
p**	> 0.05							

*DC: Decayed component; DF: Filled component; DFC: Filled and decayed component; DM: Missing component; **Mann-Whitney test

Table 3: Oral health-related quality of life in children 12 years of age with clefts by size, according to DIDL instrument

	n (%)	Eating 8 (16.00)	Speaking 17 (34.00)	Hygiene 23 (46.00)	Resting 4 (8.00)	Smiling 14 (28.00)	Stress 9 (18.00)	Studying 4 (8.00)	Having fun 4 (8.00)
Frequency	0	84.00	66.00	54.00	92.00	72.00	82.00	92.00	92.00
	1	4.00	6.00	8.00	2.00	6.00	4.00	4.00	4.00
	2	4.00	20.00	22.00	0.00	4.00	6.00	0.00	0.00
	3	2.00	2.00	8.00	0.00	6.00	6.00	2.00	0.00
	4	4.00	4.00	8.00	6.00	10.00	2.00	0.00	4.00
	5	2.00	2.00	0.00	0.00	2.00	0.00	2.00	0.00
Intensity	0	84.00	66.00	54.00	92.00	72.00	82.00	92.00	92.00
	1	8.00	12.00	14.00	4.00	8.00	2.00	2.00	6.00
	2	2.00	16.00	16.00	0.00	10.00	6.00	2.00	0.00
	3	0.00	2.00	2.00	0.00	4.00	2.00	2.00	0.00
	4	4.00	2.00	6.00	2.00	4.00	2.00	0.00	0.00
	5	2.00	2.00	8.00	2.00	2.00	6.00	2.00	2.00
DIDL (average; standard deviation)		1.20 (3.95)	1.70 (3.61)	3.16 (5.36)	0.82 (3.61)	2.16 (4.72)	1.52 (4.16)	0.70 (3.63)	0.52 (2.87)
Cronbach's alpha		0.89	0.88	0.88	0.89	0.89	0.90	0.91	0.88

The correlation of Spearman between the DMFT index, its components and the instrument for assessing the QoL related to oral health DIDL was statistically significant among the missing component (DM) and the dimensions 'Stress' ($r = 0.35$, $p < 0.01$), and 'Study' ($r = 0.52$, $p < 0.01$).

DISCUSSION

The concept of epidemiology as the population research in view of the frequency and distribution of diseases and health problems and its biological and social determinants of health-related factors. Based on epidemiological findings becomes possible, therefore, to plan actions in order to prevent and control health problems of population groups. Dental caries has been tackled under this epidemiological concept, however, is still a major public health problem and an important threat to the oral health of populations.¹⁴

Dental caries is still a disease of high importance in the population,¹⁴ despite the decline in incidence in recent decades.¹⁵ The prevalence of this disease in patients with cleft lip and palate has been presented with higher severity in several studies in Brazil and elsewhere,¹⁶ as observed at Vietnam¹⁷ and Poland and Germany.¹⁸

The prevalence of caries in patients with cleft lip and palate was studied in Vietnamese children in 2004.¹⁷ At the South, 154 hospitalized children were

examined in five different cities. The prevalence of dental caries observed, based on DMFT (WHO criteria) in 11 to 13 years children was 2.97, and 14 to 16 years was 4.93, all with cleft lip, palate or both. It was concluded that carriers this congenital anomaly in Vietnam children had high prevalence of dental caries and that special attention to oral health of these individuals is a necessity. Also, in 2007, with the aim of evaluating and comparing the status and the level of oral Poles and Germans with cleft lip and palate in Lodz and Erlangen for better planning of health actions in these patients a survey of dental caries was performed. Two groups were determined, 37 Poles and 63 Germans in 2004 and 2005, and it was concluded that in both populations studied the tooth decay was much higher than in the general population and significantly higher among Poles than Germans with cleft lip and palate. Programs to promote the oral health of these children were recommended, especially with the aim of controlling biofilm notably in the early ages of their lives.¹⁸

In this research, this concept was not sheltered, it was observed that the severity of dental caries (1.70) was lower than the Brazilian national average (DMFT = 2.07), however, compatible with the average in the southeast region (DMFT = 1.72),¹⁹ the Brazilian region in which the Tertiary Craniofacial Center is located, it seems that the efforts to control dental caries among cleft lip and

palate patients at Tertiary Craniofacial Center are resulting. Nevertheless, the caries prevalence observed was capable of causing negative impact on QoL, especially in the dimensions stress ($r = 0.35$, $p < 0.01$) and studying ($r = 0.52$, $p < 0.01$).

The decline in dental caries is well documented now through epidemiological studies based in Brazil and much of the world in recent decades and this decline has been presented with some reasons for the general population.²⁰ In Brazil, the availability and consumption by populations of fluoride added to drinking water is one of these factors, which began in 1953 in the city of Baixo Guandu, state of Espírito Santo. Only in 1974 this method of preventing mass became a federal law (6050/1974).²¹ In 1989, the decree number²² of the Ministry of Health established rules for the first time for the addition of fluoride to toothpaste to be made available to the Brazilian domestic market.²² Until today, there is no obligation on the addition of this chemical element, however, when added must follow a legal prescription of a minimum concentration from 1100 to 1500 mg/liter, at the time under the condition of being a ionically free or ionized. The mandatory solubility ended in 1994.²³

Four national surveys of dental caries index for age 12 years were held in Brazil, under the coordination of the Ministry of Health. The first in 1986,²⁴ the second in 1996,⁶ and 2003⁷ for the latest in 2010.^{19,25} The DMFT shown, respectively, in 1986 was 6.7, followed by 3.1 and 2.8. In the last survey, the severity of decay assessed by DMFT for this same age was 2.1. The observed decline was 69.12% in 24 years. Also for this decline, besides the use of fluoride by water and toothpastes, the decentralization of the Brazilian health system causing improvement in oral health through prevention programs that started to focus their actions on social determinants. Individuals free of caries increased from 3.7% for a prevalence of 31.1% in the country in 2003. In 2010, data released by the Ministry of Health reported an increase to 44% in disease-free.

Clefts can be classified according to the anatomical involvement in cleft lip, complete cleft lip and palate, cleft palate and rare cleft face.²⁶ In this study, cleft lip and palate were present and considered together, as done in other studies.^{4,17} However, the ideal would be to collect data from patients with different types of clefts but the difficulty in accessing each case within the hospital where the primary interest of patients is related to their treatment led the authors to choose the methodology presented here. Also, socioeconomic status was not collected and may interfere in dental caries incidence, as well as the exposure to public water supply, nevertheless the Oral and Maxillofacial Surgery Hospital of the

University of Damascus in Siria⁸ conducted a comparative study between siblings with and without cleft palate in a total of 106 study subjects aged between 12 and 29 years. Epidemiological investigations with the DMF index in both groups were performed, and a statistically significant association was found between cleft lip and palate and dental caries ($p < 0.001$) and that cleft lip and palate patients was susceptible to tooth decay regardless of socioeconomic level they belonged to.

The present study demonstrated good internal validity once held the single examiner calibration prior to the data collection of the study with a standard examiner (Kappa > 0.80), and the DIDL instrument presented reliable Cronbach alpha for each dimension. During the data collection, the repetition of epidemiologic examination each five cases (Kappa = 0.98) were performed. Obtained good agreement intraexaminer throughout the study. As for the potential of generalization is important to note carefully the data presented because the subjects were seeking treatment at HRAC/USP, nevertheless it must be considered the shortage of cases and the difficulty of access to them once they are present at the hospital with the aim to follow-up their regular treatment. For this reason, it was chosen to follow the indication of sample recommended by WHO in 1997 with 50 research subjects.¹¹ Another important aspect relates to the tendency of the cleft lip and palate patients who has higher caries prevalence indicators in females ($p < 0.05$).

The differences between the sexes were significant, the data collected showed a higher incidence of dental caries in women with cleft to 12 years and that this group gets larger clinical care with higher representation of DMFT ($p < 0.05$) in the teeth components filled (DF/1.65, 1.69) and missing (DM/0.12, 0.49) with higher prevalence in decay component (DC/0.47, 1.07), a lower percentage of caries-free (17.65%) and SiC index higher ($p < 0.02$). This trend is commonly observed at other studies.^{18,22,23,34}

Regarding oral health-related QoL, the more prevalent in the dimensions hygiene (46.00%), speech (34.00%) and smiling (28.00%), and highest impact DIDL for these same dimensions different order, i.e. respectively the following intensities (3.16, 5.36/1.70, 3.61/2.16, 4.72), which demonstrates the clear need to intensify education about criteria for oral hygiene, the care in speech and orofacial attention to esthetics. Although these were the highest observed effects, the second indicator used DIDL all dimensions had become prevalent. These impacts are related to psychosocial perception of oral health-related QoL, it included tooth decay as well as the cleft lip and palate condition.

The correlation between the DMFT and its components with IODD presented different results between the



sexes, and the stress dimensions and the act of studying statistically significant with the lost tooth dimension (SD) for all group. Interestingly, the correlation was directly proportional and moderate intensity for females because there were not registered missing teeth in the male group. This fact corroborates the idea that tooth decay caused higher negative impact on QoL of women in this group and, therefore, the seek more intensely for dental care demonstrated by the Care Index.

Epidemiological studies have shown higher prevalence of dental caries in patients with cleft lip and palate,^{8,22,23} which was not demonstrated in the study presented here. For this reason, it is suggested to continue this line of research to investigate what are the objective of health promotion activities relating to education and prevention of dental caries, especially on tackling the social determinants of health/disease, because it have caused higher control of dental caries among cleft patients,²⁶⁻³⁰ along with the dental caries decline shown in the last Brazilian dental caries surveys.

CONCLUSION

The presence of cleft lip and palate in subjects 12 years of age had a negative impact on QoL and this impact was also significant for those who had tooth loss caused by dental caries. The use of strategies in health education is suggested to promote oral hygiene quality with fluoridated toothpaste, as well as new studies relating the prevalence of cleft lip and palate, dental caries and QoL.

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