ORAL HEALTH AND ORAL HYGIENE CONDITIONS AND NUTRITIONAL STATUS IN CHILDREN ATTENDING A HEALTH FACILITY IN THE HUANUCO REGION, PERU

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ABSTRACT

In order to determine the association between oral health and oral hygiene conditions and nutritional status in children using a health facility in the Huánuco region, a cross-sectional descriptive study was conducted in 118 children who attended the Growth and Development Control (CRED) of the health clinic "La Esperanza." Oral health and hygiene conditions were evaluated by visible bacterial plaque, simplified oral hygiene, simplified bleeding, and gingival inflammation indices. Nutritional status was obtained from the last CRED control recorded in the clinical history. Acute malnutrition (AM) was the most common nutritional status. Among children with AM, the proportion of severe gingival inflammation was 60.3%; gum bleeding, 61.5%; dentobacterial plaque presence, 59.3%; and poor oral hygiene, 60.3%. There is evidence of a greater impact of oral health and oral hygiene on children with malnutrition, mainly acute.

Keywords: Oral Health; Nutritional status; Children; Peru (source: MeSH NLM).

INTRODUCTION

Oral hygiene plays an important role in the prevention of oral diseases, such as periodontal disease, with carries a series of inflammatory and infectious processes that damage the supporting tissue of the teeth (gum, bone and periodontal ligament), altering its physiology and aesthetics [1]. These diseases are more prevalent in the adult and older adult stages of life. However, studies indicate that gingivitis (considered the first phase of periodontal disease) is present in almost the entire population of children and, in many cases, its evolution is painless, thus increasing the possibility of creating a chronic disease [2].

The Latin American Association of Periodontal Dentistry points out that periodontal diseases in children and adolescents have different prevalence, and that gingivitis is almost universal [3]. At the same time, the absence of gingival hemorrhage is a reliable clinical indicator of periodontal stability [4].

The nutritional status is the result of an individual's food intake and his or her need for nutrients; nutritional health is also considered to be the consequence of biological, psychological and social interactions [5]. Chronic undernutrition is an indicator that helps to measure the results of a country's food policies [6]. Nutrition is very important in the prenatal stage and during the first five years of life, as it has a direct relationship with growth and with the biochemical and mental development [7]. Therefore, malnourished children may be at greater risk for certain diseases, including periodontal diseases. In the scientific literature there are but a few studies on the possible relationship between periodontal disease in childhood and nutritional status.

Currently there is a greater concern for the prevention of periodontal disease through oral hygiene and for finding out its relationship with the nutritional status. In this connection, the objective of the present study is to determine the association between oral health conditions, oral hygiene and nutritional status in children

between the ages of three and five years who went to a health facility in the Huánuco region during 2018.

THE STUDY

DESIGN AND POPULATION

A cross-sectional descriptive study was conducted in the Huánuco region of Peru. According to the National Institute of Statistics and Computer Science, chronic malnutrition among children under five increased in ten regions of Peru, including Huanuco (2.8%) [5].

The study population was comprised of children between the ages of three and five years who had been cared at the level 1-2 in the «La Esperanza» Health Post, of the Ministry of Health, located in the district of Amarilis, province and region of Huanuco. This facility is located in an area of quintile 1 (population in extreme poverty).

The sample consisted of 118 children who came to the facility between October and November 2018 for their growth and development (GROD) check-up. The selection was made using an incidental non-probabilistic sampling. We excluded children with diabetes mellitus; respiratory, renal, metabolic and viral diseases; cardiac anomalies and/or under medical treatment, mental alterations (schizophrenia, mental retardation, Down's syndrome, or autism), with dental crowding, lack of primary spaces and/or with orthodontic appliances, with overflowing and filtering dental restorations in faces with no primary teeth.

VARIABLES

The dependent variables were the oral health and oral hygiene conditions that were determined through the visible bacterial plaque index (Silness and modified Löe), the simplified oral hygiene index (S-OHI), the simplified hemorrhage index (S-HI) and the gingival inflammation index (GII).

The independent variable was the nutritional status (overweight, acute malnutrition, chronic malnutrition and normal nutrition). To determine the nutritional status of the child, the latest GROD check-up that appeared in the clinical history was checked. In addition, two more variables: age (in years) and sex (male or female) were collected [10-15].

PROCEDURES

In the intraoral clinical examination, the examiner guaranteed the reliability and validity of the

KEY MESSAGES

Research Motivation. There are not many studies in the scientific literature that establish a connection between nutritional status and oral health conditions in children.

Main Findings. Children with acute malnutrition are more affected in terms of oral health and oral hygiene. On average, six out of ten children have severe gum inflammation, bleeding gums, plaque, and poor oral hygiene.

Implications. This study will contribute to the improvement of oral health programs by deepening the knowledge of professionals so they can educate parents about the importance of oral hygiene in their children.

measurements, based on the criteria recommended by the World Health Organization (WHO). The main investigator (a female dental surgeon) was trained by an expert periodontist on the diagnosis of the periodontal state and on the handling of the measuring instrument. The Cohen´s kappa inter and intraexaminer coefficient was 0.7 for each index.

In each patient, the examiner used a pair of disposable latex gloves, disposable mask, protective glasses, two intraoral mirrors No. 5 and one periodontal probe, WHO type (which is characterized by being lightweight, with a spherical tip of 0.5 mm, with a black band of 2 mm located between 3.5 and 5.5 mm, and rings located at 8.5 and 11.5 mm from the spherical tip). The instruments were sterile at the time of exploration. The dental examination was initiated with the patient positioned in the dental unit under direct light.

With the Simplified Oral Hygiene Index (S-OHI) two risk factors were evaluated: dentobacterial plaque and supragingival calculus on six tooth surfaces: 55, 51, 65, 75, 71 and 85. We used the WHO probe by sliding it over the surface, from mesial to distal of the indicator tooth and respecting the surface (vestibular or lingual); the average was obtained, and the rating scale was good oral hygiene (0.0 to 1.2), fair (1.3 to 3.0) and poor (3.1 to 6.0).

Using the gingival inflammation index (GII), teeth 55, 51, 65, 75, 71, 85 were evaluated. We introduced 0.5 mm of the probe into the gingival sulcus and gingival surfaces per tooth: vestibular (teeth 55, 51, 65) and lingual (teeth 75, 71, 85). The measurement scale was healthy gum (0.0), mild inflammation (0.1 to 1.0), moderate inflammation (1.1 to 2.0) and severe inflammation (2.1 to 3.0). The value of the GII was calculated by adding

gingival surfaces according to the scale and dividing the result by the total number of teeth; the average of these measurements was the GII for the whole mouth.

With the visible bacterial plaque index (Silness and modified Löe), the indicator teeth 51, 63, 84 and the last four molars present in each quadrant were evaluated. We observed the vestibular, lingual/palatinal, mesial and distal surfaces, and in the posterior teeth the occlusal surface was also evaluated. We used a score of 0=no plaque and 1=evidence of thick plaque, the one that is easily noticeable for being considerably thick, or if when applying air and/or gently passing a probe a thin plaque is evident. To calculate the percentage of plaque, we counted the number of surfaces with plaque (value of 1), multiplied it by 100 and divided it by the number of surfaces evaluated. The final categories were good oral hygiene (0% to 15%), fair (16% to 30%) and poor (>30%).

With the Simplified Hemorrhage Index (S-HI) the gingival hemorrhage in each tooth was evaluated by gently inserting the periodontal probe into the gingival sulcus. The chosen teeth were: 55, 61, 64, 75, 81 and 84. The probe was applied in four gingival areas per tooth: distal, vestibular, mesial and palatal/lingual. The codes used were: 0=no bleeding (didn´t bleed 10 seconds after application) and 1=presence of bleeding. The value of the gingival hemorrhage index was calculated by adding the values obtained and dividing the result by the total number of surfaces examined. Finally, the patient was in good periodontal health when the simplified bleeding rate was less than one.

STATISTICAL ANALYSIS

The statistical program Stata, version 14.9, was used to analyze the data. In order to carry out the descriptive analysis, the frequencies and percentages of the study variables were determined. To verify the hypothesis, the exact Fisher test was used and a value of $p < 0.05$ was considered statistically significant.

ETHICAL CONSIDERATIONS

The work was approved by the Institutional Research Ethics Committee of Universidad Cientifica del Sur. The head of the Health Clinic "La Esperanza" authorized the implementation of the study. Informed written consent was requested from the children's parents or legal guardians.

RESULTS

We evaluated 118 children, 35.6% of which were three years old, 30.5% four years old and 33.9% five years old. Moreover, 53.4% of the children were male and 46.6% were female. With regards to their nutritional status, acute malnutrition was the most frequent, at 47.5%, followed by chronic malnutrition, at 21.2%, and overweight, at 4.2%. In addition, regarding the conditions of oral health and oral hygiene, the most prevalent were severe gingival inflammation (53.4%), presence of gum bleeding (77.1%), presence of dentobacterial plaque (72.9%) and poor oral hygiene (52.4%) (Table 1).

Regarding the evaluation of the oral health and oral hygiene conditions according to the nutritional status, it was found that 60.3% of children with severe gingival inflammation, 61.5% of children affected by bleeding gums, 59.3% of children with dentobacterial plaque and 60.3% of children with poor oral hygiene also had

Table 1. Characteristics of oral health, oral hygiene, and nutritional status of children between three and five who visited the Health Clinic "La Esperanza," Huanuco, 2018

Characteristics	n=118 (%)
Age (years)	
3	42 (35.6)
4	36 (30.5)
5	40 (33.9)
Sex	
Male	63 (53.4)
Female	55 (46.6)
Nutritional status	
Normal	32 (27.1)
Overweight	5 (4.2)
Acute malnutrition	56 (47.5)
Chronic malnutrition	25 (21.2)
Gingival inflammation	
No inflammation	31 (26.3)
Mild	16 (13.6)
Moderate	8 (6.8)
Severe	63 (53.4)
Bleeding gums	
Does have	91 (77.1)
Doesn't have	27 (22.9)
Plaque	
Does have	86 (72.9)
Doesn't have	32 (27.1)
Oral hygiene	
Good	31 (26.3)
Fair	24 (20.3)
Poor	63 (52.4)

Table 2. Oral health and oral hygiene conditions according to the nutritional status of children between three and five who visited the Health Clinic "La Esperanza," Huanuco, 2018.

Conditions	Nutritional status				Total	p value
	Normal n (%)	Overweight n (%)	Acute malnutrition n (%)	Chronic malnutrition n (%)		
Gingival inflammation						<0.001
No inflammation	27 (87.1)	0 (0.0)	4 (12.9)	0 (0.0)	31	
Mild	3 (18.8)	3 (18.8)	10 (62.5)	0 (0.0)	16	
Moderate	2 (25.0)	1 (12.5)	4 (50.0)	1 (12.5)	8	
Severe	0 (0.0)	1 (1.6)	38 (60.3)	24 (38.1)	63	
Bleeding gums						<0.001
Does have	5 (5.5)	5 (5.5)	56 (61.5)	25 (27.5)	91	
Doesn't have	27 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	27	
Plaque						<0.001
Does have	5 (5.8)	5 (5.8)	51 (59.3)	25 (29.1)	86	
Doesn't have	27 (84.4)	0 (0.0)	5 (15.6)	0 (0.0)	32	
Oral hygiene						<0.001
Good	27 (87.1)	0 (0.0)	4 (12.9)	0 (0.0)	31	
Fair	5 (20.8)	4 (16.7)	14 (58.3)	1 (4.2)	24	
Poor	0 (0.0)	1 (1.6)	38 (60.3)	24 (38.1)	63	

*Fisher's exact test.

acute malnutrition. Furthermore, a statistically significant association between oral health and hygiene conditions and nutritional status (p < 0.05) was also established (Table 2).

DISCUSSION

Acute malnutrition was the most common condition found among the evaluated children. Bacterial plaque was found in high percentages; in addition, there was a significant proportion of children with poor oral hygiene, gingival hemorrhage or bleeding of the gums, and severe gingival inflammation. We found that poor nutritional status, mainly acute malnutrition, is accompanied by poor oral health, probably as a result of poor habits and scarce resources of these patients.

In a study conducted in Africa by Baratti-Mayer et al. [11] a connection was established between acute necrotizing gingivitis and the nutritional status and oral hygiene practices of young children, which coincided with the results of the present study. In addition, Achmad et al. [12] found that underweight people were more likely to have mild gingivitis and concluded that there is a relationship between nutritional status and gingivitis and the severity of tooth decay. Another study carried out in Cusco, Peru [13] concluded that there is a relationship between nutritional status and dental cavities, a result similar to ours, probably because in both regions hygiene and eating habits are similar.

In assessing the nutritional and oral health status, Najeeb *et al.* [14] found an association between being overweight and the periodontal health of adolescents, where 98.4% of overweight patients had some type of periodontal changes, like bleeding (34.3%), calculus (38.8%), shallow pockets (22.9%), and deep pockets (2.3%), a similar result to the one found in this study.

In general, there is a history linking poor oral health with altered nutritional status [19,20]. But there are other studies that find no association between these two conditions. Alphonce *et al.* [18] did not find any association between nutritional status and gingivitis in children ages three to five years, however, they did not assess the other nutritional conditions. Castaneda Alvarado [19] states that acute or chronic malnutrition is related to a bad oral health condition, measured through its various indicators such as gingival inflammation, gingival bleeding, poor oral hygiene and the presence of dentobacterial plaque.

Among the limitations, the small size of the sampling should be mentioned, given that it is considered that a bigger sampling could carry a higher statistical power to demonstrate the association between the main variables; another limitation is the lack of standardization of periodontal norms, guides and indices for children, given that even though there are many indices, most of them have been established for adults. Because of this, more studies should be conducted to substantiate the results obtained.

The results of this research indicate that the state of malnutrition (acute or chronic, in greater percentage the acute) is mainly related to a poor oral health condition, measured through different indicators, like gingival inflammation, gingival bleeding, poor oral hygiene and the presence of plaque. These results should be taken into account to strengthen prevention and permanent control measures [20]. In conclusion, this study shows that the oral health and oral hygiene of children with malnutrition, especially acute, are more impacted.

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