Prevalence and severity of dental caries and oral hygiene in children and adolescents in Children's Villages, Lima, Perú

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ABSTRACT

Objective: To determine the prevalence and severity of dental decay and oral hygiene in children and adolescents in Children's Villages of Lima. ***Materials and methods*:** Transversal descriptive study. A non-random sample of 224 children aged 1 to 17 who resided in one of three SOS Children's Villages participated in the study. Dental decay was evaluated with the WHO diagnostic criteria, and oral hygiene was measured with the Greene and Vermillion Debris Index. ***Results:*** The prevalence of dental decay in the group aged 1-4 was 36.8%, and in the 5-7, 11-13 and 14-17 groups, the prevalence was 67.7%, 56.6% and 82.4%, respectively, considering both dentitions. Caries severity (dmft+DMFT) in the same groups had an average ± standard deviation of 1.16±2.41, 3.48±3.71, 1.66±2.02 and 3.19±2.51, respectively. Fair oral hygiene was predominant in the sample, with a prevalence above 50% in all age groups, with the exception of the 14 to 17 age group, where hygiene proved to be more frequent (67.2%). ***Conclusions:*** Results show a significantly high prevalence of dental decay alongside poor oral hygiene, proving that it is necessary to implement oral health programs for at-risk populations.

Keywords: dental decay; DMF index; orphaned children; oral hygiene; oral health; Peru (DeCS, BIREME).

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INTRODUCTION

Dental caries is a public health issue that affects the population worldwide[1], and the Peruvian population is no exception. The latest nationwide survey on the oral health status of children aged 6 to 15 showed that the prevalence of dental caries at age 12 was 87%, with a 3.7 DMFT index[2]. Basic oral health programs (promoting prevention) are ineffective when it comes to reducing the epidemiological indexes of oral diseases.

Several studies have been conducted with children and young people who are not interned in shelters[3]. Ojeda et al. studied 1,566 children and adolescents of Navarra, Spain finding a 35.4% prevalence of caries in primary dentition in 6-year-olds (dft 1.28) and of 50.7% in permanent dentition in 14-year-olds[4]. In a study involving 120 schoolchildren in Argentina, Herrera et al. found that 64% of 8-year-old children had caries with different degrees of severity. Between the ages of 6 and 8, the dmft was 6, and there was no difference between boys and girls. However, boys between 14 and 23 years of age had an average DMFT of 8, whereas the average DMFT was 11 for the girls[5].

Villalobos-Rodelo et al. evaluated 1,500 schoolchildren between the ages of 6 and 12 in Nicaragua. They found that 28.6% had no caries; the prevalence of caries in primary dentition at the age of 6 was 72.6%, and 45.0% in permanent dentition at the age of 12[6].

Ortega et al. evaluated 3,547 children aged 6 to 12 in 18 primary schools in Sinaloa, Mexico. They had a dmft of 4.68±3.21 and the prevalence of caries was 90.2% (dmft > 3 = 60.8%); DMFT was 3.24±2.72 and the prevalence of caries was 82% (DMFT > 3 = 47.8%)[7]. Pérez-Dominguez et al. studied 590 Mexican schoolchildren aged 13 to 16, and found the prevalence of dental caries to be 92.2 % with a DMFT of 7.3. They examined 1,012 children and 533 adolescents in Mexico and found a prevalence of caries of 66.9%; the dmft index at age 6 was 3.57±2.8 the DMFT at age 12 was 1.97 ± 1.4[8].

The accumulation of bacterial plaque is usually the inception of different kinds of lesions in the oral cavity, such as dental caries. The bacterial plaque level determines the severity of the impact of the disease on the teeth. A study conducted in New Zealand with adults under 32 years of age showed that those who had a higher plaque index were 5 times more likely to lose teeth due to dental caries than those who had lower indexes[9].

A study conducted with adolescents aged 10 to 18 in two cities in Brazil showed that most of them brushed their teeth three times a day. The occurrence of dental caries was quite low, 27% had gingivitis, and periodontal tissue was well preserved[10].

Knowing the epidemiological profile of a population allows for the creation of projects relevant to the issues or alterations present in the stomatognathic system. Children and young people who live in shelters are a population of particular concern for they lack parental guidance, which is known to be vital for their oral health. This was shown by a study conducted among adolescents, which found that the higher the level of education of the parents, the better the children's oral health conditions[10].

A study was conducted with 38 Nigerian orphans aged 6 to 17, using the Greene Vermillon index; it showed that 73% had fair dental hygiene. The highest plaque index was found among the children aged 6 to 9, and the girls had better oral hygiene than the boys[11].

The prevalence of dental caries among 2,482 children aged 5 to 12 treated in a university clinic in Lima, Perú was 91.5%, with a higher incidence in boys (89.77%) than in girls (93.19%).

Arranged by age, the highest rates of prevalence of the disease were found in children aged 9 and 11 (94.3% and 93.8%, respectively), and the lowest in 5-year-olds (85%)[12].

For a sample of 1,022 5-year-old children in south Brazil, it was found that the prevalence of bacterial plaque was higher among children with irregular oral hygiene habits stemming from lower income families, or whose mothers had a lower level of academic achievement[13]. A study in Nigeria showed that only 41 (10.5%) of the 389 children examined had dental caries. It was shown that 276 (77.5%) had good oral hygiene conditions, 198 (51.4%) used a toothbrush, 269 (71%) brushed once a day, and 86 (22.7%) brushed twice a day. The children's oral hygiene conditions were a risk factor for dental caries[14].

Currently there is no epidemiological profile of children and youth living in shelters in our country, which may be used as the basis to create a preventative oral health program aimed at controlling and treating the most prevalent oral diseases. This would be accompanied by education of the population under study, aimed at providing them with tools to adequately handle their diet, their hygiene habits, and to correct harmful habits. Overall, this study will promote a prevention-based culture for the processes which lead to oral disease.

The aim of this study was to determine the prevalence and severity of dental decay and oral hygiene in children and adolescents in Children's Villages of Lima.

MATERIALS AND METHODS

A cross-sectional descriptive study was conducted. The population under study was all the children and adolescents living in the 12 SOS Children's Villages of Perú in 2013. The sample used was a non-probability sample consisting of the residents of three of the Children's Villages in Lima, one located in the San Juan de Lurigancho district, Zárate urbanization, and two located in the Chosica district. Only individuals under 18 who gave their consent for the oral evaluation were considered.

The goal of SOS Children's Villages is to provide a family environment and solid grounding so that these boys, girls, and young people, who have lost their parents or who for some reason

cannot be with their birth families, can lead an autonomous life. Each child is assigned a mother, siblings, and a home in a village that provides support.

The project was approved by the Research Institute at the School of Dentistry of San Martín de Porres University. The study was conducted with the permission of the Children's Villages authorities and of the SOS mothers.

The oral examinations were conducted by two teams made up of an examiner and a recorder between May and July, 2013, who examined all the children and adolescents in the three SOS Children's Villages, to find dental caries (using the dmft-DMFT) based on the WHO diagnostic criteria[15] and the oral hygiene level (using the Greene and Vermillion soft debris index)[16].

The teams were trained and calibrated according to the WHO diagnostic criteria (kappa=0.78). The DMFT index indicates the number of decaying, missing and filled teeth in a patient. It also shows the caries experience, i.e. the number of teeth that have been affected by caries in their life. The prevalence of dental caries was considered at a dmft-DMFT>0 and the severity was calculated from the mean of said index. The significant caries index (SCI) was also measured, focusing on those individuals with the highest tooth decay levels among the population; for this the average DMFT was calculated for the third of the population with the highest incidence of caries. On the other hand, the Greene and Vermillion (S-OHI) simplified oral hygiene index includes two components: soft plaque and tartar. This study only evaluated soft plaque in the index teeth, on the vestibular surface of 1.6, 1.1, 2.6, and 3.1, and on the lingual surface of 3.6 and 4.6. In the case of children with deciduous dentition or mixed dentition, where it was not possible to evaluate permanent teeth, the evaluation was done on the vestibular surface of 5.5, 5.1, 6.5, and 7.1, and on the lingual surface of 7.5 and 8.5. Oral hygiene was classified as good (0-0.6), fair (0.7-1.8) and poor (1.9-3.0). Training for the assessment of dental plaque was provided in a theoretical and practical discussion. As the plaque examination and in some cases gingival bleeding altered the oral environment, it was not possible to assess reproducibility.

Exam instruments (mouth mirror, probe, and cotton pliers) were used to evaluate the oral health conditions of the children and adolescents. The data were recorded on a file created for this specific purpose. The oral examinations were accompanied by oral health care talks.

The results were processed and analyzed with the SSPS v21 statistical software. Frequency distribution tables were used to measure the prevalence of dental caries and oral hygiene according to sex and age group, and summary measures were used (median and standard deviation) to describe the dmft-DMFT index for components, dentition, and total, as well as the significant caries index.

RESULTS

The sample comprised 224 children aged 1 to 17, with a mean of 10.7 years and a standard deviation of 4.1 years. Of the children, 123 (54.9%) were boys, and the largest age group (30.4%) was 14 to 17, followed by 8 to 10 year-olds, and 11 to 13 year-olds, each of which covered 23.7% (Table 1).

Table 1. Frequency distribution according to sex and age group for the study sample

Characteristics	**N**	**%**
Sex		
Males	123	54.9
Females	101	45.1
Age group		
1 - 4	19	8.5
5 - 7	31	13.8
8 - 10	53	23.7
11 - 13	53	23.7
14 - 17	68	30.4

The prevalence of dental caries in deciduous dentition in the 1 to 4 age group was 36.8%. In the 5 to 7 group it was 67.7% for both dentitions; this percentage grew as the children got older, reaching 82.4% in the 14 to 17 group. This upward trend in the prevalence of caries as age increases was also found in the individual analysis of each dentition. The analysis of deciduous and mixed dentition showed that the only age group which did not follow this pattern were the 11 to 13 year-olds. In terms of the prevalence of caries according to sex, girls had a larger proportion of caries in deciduous dentition (68.2%), while boys had the larger proportion in permanent dentition (55.8%), and there was practically no difference for both dentitions, which almost reached 70% for both sexes (Table 2).

Table 2. Prevalence of dental caries according to sex and age group in children and adolescents in SOS Children's Villages, Perú

Covariables	Prevalence of dental caries					
	Deciduous dentition		Permanent dentition		Both dentitions	
	n	%	n	%	n	%
Sex						
Males	28	50.0	63	55.8	84	68.3
Females	45	68.2	41	47.7	70	69.3
Age group						
1 - 4	7	36.8	0	0	0	0
5 - 7	20	64.5	2	8.0	21	67.7
8 - 10	35	70.0	20	37.7	40	75.5
11 - 13	11	52.4	26	49.1	30	56.6
14 - 17	0	0	56	82.4	56	82.4

The analysis of dental caries based on the dmft-DMFT index and its components for each age group found the highest mean value±standard deviation for dmft (3.42±3.71) in deciduous dentition in the 5 to 7 age group, the caries component (3.16±3.50) being the one which contributed the most to the index. This was also the case for the other age groups. The filling component was more present in the 8 to 10 age group, with a mean±standard deviation of 1.06±1.77, very close to the values for the caries component (1.44±1.74) (Table 3). For the permanent dentition we found that the older the patients, the higher the DMFT value, which reached 3.19±2.51 in the 14 to 17 age group. The largest contribution to the index was given by the caries component across all age groups, with the exception of the 14 to 17 age group, where the filling component reached 2.22±2.36. The "extracted due to caries" component was virtually inexistent in both dentitions (Table 3).

Table 3. Severity of dental caries (dmft-DMFT index per component and dentition) according to age group in children and adolescents in SOS Children's Villages, Perú

		Dental caries (mean±SD*)									
Age group	**n**	**d**	**e**	**f**	**dmft**	**n**	**D**	**M**	**F**	**DMFT**	**SCI†**
1 - 4	19	1.16±2.41	0	0	1.16±2.41	0					
5 - 7	31	3.16±3.50	0	0.26±0.58	3.42±3.71	25	0.04±0.20	0	0.04±0.20	0.08+0.28	0.25±0.46
8 - 10	50	1.44±1.74	0.06±0.31	1.06±1.77	2.68±2.33	53	0.51±0.80	0	0.06±0.23	0.57±0.84	1.56±0.70
11 - 13	21	0.90±1.22	0.05±0.218	0.10±0.30	1.05±1.28	53	0.72±1.08	0.02±0.14	0.51±1.03	1.26±1.68	3.28±1.32
14 - 17	1	0	0	0	0	68	0.91±1.12	0.06±0.24	2.22±2.36	3.19±2.51	6.09±1.47

*SD: Standard deviation

†SCI= Significant caries index

Regarding the significant caries index, we found that three out of the four age groups under study registered values higher than double those obtained from the DMFT, only in the 14 to 17 age group were these values slightly lower than double (6.09±1.47). However, this was the group with the highest SCI value compared to the others (Table 3).

From the overall comparison of the dmft-DMFT index according to sex, the mean value±standard deviation was slightly higher in girls (2.87±2.86) than in boys (2.51±2.63), whereas when comparing the different age groups we found that the lowest mean value (1.16±2.41) and the highest mean value (3.48±3.71) were present in the 1 to 4 age group, and in the 5 to 7 age group, respectively. The highest value for the dmft-DMFT index was 13, found in the 5 to 7 age group. The overall mean value of the dmft-DMFT index was 2.67 (Table 4).

Table 4. Severity of dental caries (dmft+DMFT) according to sex and age group in children and adolescents in SOS Children's Villages, Perú

		dmft+DMFT			
Covariables	**n**	**Minimum**	**Maximum**	**Mean**	**SD***
Sex					
Males	123	0	12	2.51	2.63
Females	101	0	13	2.87	2.86
Age group					
1 - 4	19	0	10	1.16	2.41
5 - 7	31	0	13	3.48	3.71
8 - 10	53	0	9	3.09	2.68
11 - 13	53	0	8	1.66	2.02
14 - 17	68	0	10	3.19	2.51
Total	224	0	13	2.67	2.74

*SD: Standard deviation

Regarding the oral hygiene level measured with the soft plaque index, the poor level was found to be the most frequent (52.8%), followed by the fair level (46.3%), and the good level was practically inexistent, only found in two children (0.9%). The comparison of dental hygiene levels between sexes showed that girls had a higher proportion of poor hygiene (57.3%) in relation to boys (49.2%). In terms of age, all the groups had poor hygiene (ranging from 54.5% to 64.5%), except the 14 to 17 age group, where fair hygiene was dominant (67.2%); the only two cases of good hygiene were found in this group (Table 5).

Table 5. Categories of the “oral hygiene” variable according to the Green y Vermillon soft plaque index, arranged by sex and age group in children and adolescents from SOS Children's Villages, Perú

Covariables	**Oral hygiene**						
	Good		**Fair**		**Poor**		**Total**
	n	**%**	**n**	**%**	**n**	**%**	**n**
Sex							
Males	2	1.7	58	49.2	58	49.2	118
Females	0	0	41	42.7	55	57.3	96
Age group							
1 - 4	0	0	5	45.5	6	54.5	11
5 - 7	0	0	11	35.5	20	64.5	31
8 - 10	0	0	19	35.8	34	64.2	53
11 - 13	0	0	19	36.5	33	63.5	52
14 - 17	2	3.0	45	67.2	20	29.9	67
Total	2	0.9	99	46.3	113	52.8	214

DISCUSSION

The prevalence of dental caries found in the study is similar to that reported in previous works conducted at the national and international level[3-9,12]. However, the general prevalence of this study shows lower levels than those reported by Rodríguez et al.[17] in a study conducted with children in institutions in Spain (76.3% of prevalence of dental caries). This difference is probably because 50% to 60% of the children in Rodríguez et al.'s study came from families at social risk (single-parent families with a low economic status, where there was unemployment, prostitution, crime, domestic violence, teenage mothers, family separation), 25%-30% of the families suffered drug or alcohol abuse, and there were mental health issues in 10%-15% of the families.

Despite the implementation of several strategies to prevent dental caries in our country, such as the Module for the promotion of oral health and hygiene within the framework of the School Health Plan and the comprehensive dental care provided by the SIS (MINSA), dental caries disease is still considered a public health issue[18].

The dental pattern found in the study agrees with the patterns described in the literature. The older the children, the higher the prevalence; the percentage for the 1 to 4 age group with deciduous dentition was 36.8%, and it reached 82.4% in the 14 to 17 year group; the same percentages were found when analyzing each individual case. However, it is possible that the behavior of the 11 to 13 age group was different given the size of the sample under study, or perhaps due to the changing dentition on the lateral sector which causes the decayed deciduous teeth to fall out, while the newly erupted permanent teeth have not been in the mouth long enough to be at risk of decay.

Regarding the prevalence of caries according to sex, the difference found between the proportion of caries in deciduous dentition in girls (68.2%) compared to permanent dentition in

boys (55.8%) is an isolated fact which would be explained in the same way by the size of the sample under study. Therefore, it is not possible to make a conclusive statement.

The decayed component is the one that contributed the most to the dental caries index for both dentitions. This could be interpreted as a need for dental care to treat and prevent carious lesions in the children and young people who live in these shelters. On the contrary, the extracted component is the one that least contributed to the index, which could be explained in part by the scarce access to oral health care. In other cases, because the severity of the carious lesions in the group of children and adolescents does not affect the pulp, they are not perceived as an emergency, and the patient does not receive tooth-preserving treatment. However, in the 14 to 17 age group the filling component prevailed over the decayed and missing components, which could mean that young people at this age take better care of their personal appearance or become more aware of the importance of good oral health care.

The oral hygiene conditions reported in the study were poor. Even if the relation between dental caries and soft plaque was not statistically evaluated, it is not surprising that a group of individuals with a high prevalence of the disease also shows poor oral hygiene conditions, as reported in previous studies[14]. A similar behavior was observed in terms of oral hygiene in the 14 to 17 age group, whose hygiene was mainly fair, owing to better self-care among this group of adolescents.

The study conducted by Ojahanon et al. [11] evaluates oral hygiene in a group of children living in an orphanage but it reports soft plaque and calculus as a whole, which makes it impossible to compare it to our results. However, the oral hygiene level found in the study was fair, which suggests that the limited conditions of the orphanage may have contributed to such situation.

The results indicate that it is important to design oral hygiene programs which focus on at-risk groups, such as children and young people living in shelters. Santos et al. state that[10] scientific research must provide data that will inform the formulation of health care policies for the population. It is also necessary to evaluate the impact of oral disease on the growth and

development of adolescents to establish accepted standards of oral hygiene at the regional level, considering local characteristics and peculiarities.

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