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Level of oral health knowledge of caregivers and its relationship with the oral health status of their children in a health center in Lima, Peru

INVESTIGATION

Nivel de conocimiento sobre salud bucal de cuidadores y su relación con el estado bucodental de sus hijos en un Centro de Salud de Lima – Perú

Nível de conhecimento sobre saúde oral dos cuidadores e a sua relação com o estado de saúde oral dos seus filhos num centro de saúde em Lima - Peru

Abstract

Objectives: To assess the level of oral health knowledge among caregivers and its relationship with the oral health status of children aged 3 to 6 years attending a health center in Lima, Peru. Methods: A cross-sectional observational study was conducted involving 70 children aged 3 to 6 years and their respective caregivers, who attended a health center in Lima, Peru. The children's oral health status was evaluated using the DMFT/dmft and OHI-S indices. A validated questionnaire, assessed by expert judgment, was used to measure caregivers' oral health knowledge. Results: A total of 58.6% of caregivers demonstrated a medium level of oral health knowledge. Among the children, 41.4% had a very low DMFT/dmft score, and 58.6% had a good OHI-S score. No statistically significant differences were found between the questionnaire responses and caregivers' sociodemographic characteristics. Furthermore, no association was observed between children's oral health status and the level of knowledge of their caregivers ($p < 0.05$).Conclusions: The children presented good oral health, and caregivers showed a medium level of knowledge. No relationship was found between caregivers' level of knowledge and their children's oral health status in the studied sample.

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Resumen

Objetivos: Determinar el conocimiento sobre salud bucal de cuidadores y su relación con el estado bucodental de niños de 3 a 6 años de un centro de salud peruano. Métodos: Se diseñó un estudio observacional y transversal en 70 niños de 3 a 6 años con sus respectivos cuidadores, los cuales asistieron a un Centro de Salud de Lima, Perú. Se registró el CPOD/ceo-d e IHOS para evaluar el estado bucodental de los niños, asimismo, mediante un cuestionario validado previamente por juicio de expertos se midió el nivel de conocimiento sobre salud bucal de los cuidadores. Resultados: 58.6% de los cuidadores encuestados tuvieron un nivel de conocimiento medio. El CPOD/ceo-d e IHOS de los niños fue muy bajo y bueno en el 41.4% y 58.6% del total de evaluados, respectivamente. No hubo diferencias estadísticas cuando se compararon las respuestas de cada pregunta del cuestionario y las características sociodemográficas. Además, no se evidenció relación entre el estado bucodental de los niños con el nivel de conocimiento de los cuidadores ($p<0.05$) Conclusiones: Los niños presentaron un buen estado de salud bucodental y los cuidadores presentaron un nivel de conocimiento medio. No hubo relación entre el nivel de conocimiento de los cuidadores con el estado bucodental del niño en la muestra estudiada.

Palabras claves: Padres, Conocimientos; Salud bucodental; Odontopediatría; Caries dental.

Resumo

Objetivos: determinar o conhecimento sobre saúde bucal dos cuidadores e sua relação com o estado de saúde bucal de crianças de 3 a 6 anos de idade de um centro de saúde em uma amostra peruana. Métodos: foi elaborado um estudo observacional e transversal com 70 crianças de 3 a 6 anos de idade e seus respectivos cuidadores, que frequentavam um centro de saúde em Lima, Peru. O CPOD/ceo-d e o IHOS foram registrados para avaliar o estado de saúde bucal das crianças, e um questionário validado por julgamento de especialistas foi usado para medir o nível de conhecimento sobre saúde bucal dos responsáveis. Resultados: 58,6% dos cuidadores pesquisados tinham um nível médio de conhecimento. O CPOD/ceo-d e o IHOS das crianças eram muito baixos e bons em 41,4% e 58,6% de todos os entrevistados, respectivamente. Não houve diferenças estatísticas na comparação das respostas a cada pergunta do questionário e das características sociodemográficas. Além disso, não houve relação entre o estado de saúde bucal das crianças e o nível de conhecimento dos responsáveis ($p<0,05$). Conclusões: As crianças apresentaram um bom estado de saúde bucal e os cuidadores apresentaram um nível médio de conhecimento. Não houve relação entre o nível de conhecimento dos cuidadores e o estado de saúde bucal das crianças na amostra estudada.

Palavras-chave: Pais, Conhecimento; Saúde oral; Odontopediatria; Cárie dentária.

Introduction

Oral conditions represent a major health issue in the healthcare systems of developing countries.[1] They tend to appear at a very early age and, due to their multifactorial nature, pose a challenge for dentists.[2] Carious lesions are currently a predominant condition, progressing with the loss of both primary and permanent teeth. It has multiple causes and is most prevalent in children under five years of age.[3] According to statistics from the Peruvian Ministry of Health in 2016, the frequency was 59.1% in primary dentition and 85.6% in mixed dentition, mainly due to poor preventive practices at home and insufficient oral hygiene.[4]

The prevalence of caries in infants varies depending on the study population. Castillo J et al.[5] mention that, based on the second national survey conducted in Peru in 25 cities between 2012 and 2014, 76.2% of teeth were found to be decayed in children aged 3 to 5 years. On the other hand, Pesaressi E et al.[6] found a 64.3% rate of carious enamel lesions in 3-year-old children in Lima. Likewise, Cayo-Tintaya et al.[7] reported 89.43%

childhood caries in 2019, indicating a moderate level of severity.

Gingivitis is one of the most prevalent periodontal diseases in children and adolescents. It begins with reddening of the tissues that support the teeth and is largely caused by the accumulation of bacterial plaque.[8] Therefore, oral hygiene is associated with the condition of the gingival tissue.[9] The frequency of gingival-periodontal diseases is variable. According to a study by Vargas-Palomino et al. in 2019,[10] a prevalence of 53.4% of severe gingival inflammation, 77.1% of gingival bleeding, and 72.9% of bacterial plaque was found in a Peruvian pediatric population. According to the Peruvian Ministry of Health, the frequency of gingival problems is 85% in the general population, and this condition has been classified as a national emergency by the Pan American Health Organization (PAHO).[11]

As shown, gingivitis, periodontitis, and dental caries are highly prevalent conditions, and due to their multifactorial nature, education and knowledge may be influential factors in their development. Peru is a multicultural country with diverse traditions, behaviors, and lifestyles; consequently, each family contributes to the personal development of its members. The oral health knowledge of caregivers could influence children, as they spend most of their time interacting with them.[12,13] Because schoolchildren aged 2 to 5 years are not yet capable of brushing their teeth properly, and their manual dexterity and awareness of maintaining good oral health are still developing, they depend largely on their caregivers to achieve proper oral hygiene through a process of learning and discipline.[14]

Currently, due to social and economic circumstances, caregivers may be devoting more time to work and survival activities, thereby reducing the time spent on child supervision and education. Various studies report the importance of the role played by parents and caregivers in maintaining good oral health during a developmental stage that is crucial for forming habits that will last into adulthood.[15,16]

In light of this, the purpose of this study was to determine the level of oral health knowledge among caregivers and its relationship with the oral health status of their children at the Nicolás de Piérola – Chosica public health center, which corresponds to the first level of care.

Methodology

Research was conducted on a sample of children aged 3 to 6 years, of both sexes, along with their respective caregivers, who attended the Nicolás de Piérola Health Center in Chosica, Lima, Peru, between April and June 2024. This was an observational, cross-sectional study. A non-probabilistic convenience sample was used, consisting of 70 caregiver/child pairs. The sample size was based on a prior study by Hamasha A, et al.[17]

The study was approved by the Research Ethics Committee of the University of San Martín de Porres under code No. 001-2024-CEI/FO-USMP.

A caregiver was defined as the individual responsible for the child's care, supervision, and habit formation. Caregivers who were illiterate, had obvious cognitive or mental limitations, or were related to the dental profession were excluded. Each caregiver signed two informed consent forms—the first for their own participation and the second for authorizing the clinical evaluation of the child in their care.

To assess the child's oral health, caries experience and oral hygiene status were evaluated using the DMFT/ceo-d index and the Oral Hygiene Index (OHI), respectively. Before data collection, the researcher was trained using a pilot group under the guidance of an expert in preventive and community dentistry. Inter-examiner and intra-examiner agreement was then assessed using the Kappa statistic, yielding values of 0.80 and 0.85, respectively. Clinical evaluation of the children was performed in a dental chair under a white LED lamp.

To measure OHI, gentian violet was applied to six teeth across four quadrants using a swab. The teeth were assessed in thirds: code 0 indicated no plaque; code 1 indicated deposits covering up to one-third of the surface; code 2 indicated deposits on more than one-third; and code 3 indicated deposits covering more than two-thirds of the surface. OHI scores were categorized as excellent (0.0), good (0.1–1.2), fair (1.3–3.0), and poor (3.1–6.0).

To assess caries experience, prophylaxis was performed on the children beforehand. A visual and tactile technique was used during recording, with a mouth mirror and round-tipped explorer. Teeth that were decayed, filled due to caries, missing, or indicated for extraction due to caries were recorded. Non-cavitated lesions were also classified as decayed. The numerical DMFT/ceo-d values were grouped into the following categories: very low (0.0–1.1), low (1.2–2.6), moderate (2.7–4.4), high (4.5–6.5), and very high (6.6 and above).

To assess caregivers' knowledge of oral health, a questionnaire previously validated by Hamasha A, et al. [17] was used. The instrument consisted of 10 questions, each with three to four distractors, of which only one was correct. The questionnaire covered topics such as the number of primary teeth, tooth brushing, the ideal timing for dental visits, the meaning of dental plaque and calculus, the importance of fluoride, the relationship between primary and permanent teeth, and the im-

pact of oral health on general health. It was translated from English into Spanish (**Figure 1**) and reviewed by five experts in community preventive stomatology, pediatric dentistry, and cariology. The V Aiken concordance analysis showed agreement indices equal to or greater than 0.8 for the dimensions of relevance (0.96), importance (0.96), and clarity (0.8). Each correct answer was assigned a score of 1, and incorrect answers received 0. To categorize the scores of correct answers, a standard-setting procedure was applied using percentile-based cut-off points, resulting in three knowledge levels: high (8–10 points), medium (4–7 points), and low (0–3 points). The questionnaire also included sociodemographic questions such as gender, age (categorized as young: 18–26 years; adult: 27–59 years; and senior: 60 years and over), education level, and socioeconomic status. The latter was determined based on the caregiver's current home address, which was cross-referenced with the block-level stratification map of Lima developed by the National Institute of Statistics and Informatics, classifying socioeconomic status as low, lower-middle, middle, upper-middle, or high. Instructions for completing the questionnaire were provided in advance.

The data were analyzed using the SPSS® statistical package, version 25. The relationship between each question's answers and the demographic characteristics was assessed using the chi-square test and Fisher's exact test. The relationship between caregivers' knowledge and the children's DMFT/ceo-d and OHI indices was evaluated using Spearman's correlation, with a 95% confidence level and a significance level of 0.05.

QUESTIONNAIRE

The purpose of this survey is to assess the level of oral health knowledge among caregivers attending the Nicolas de Piérola Health Center. Please note that your personal information is confidential, and all results will remain anonymous.

Please read each question carefully and respond according to your own judgment. We appreciate your valuable participation.

1. What is the total number of primary teeth a child has?
   - **A.** 12
   - **B.** 16
   - **C.** 20
   - **D.** I don't know

2. What is the ideal duration of tooth brushing?
   - **A.** A few seconds
   - **B.** 1 minute
   - **C.** 2 minutes
   - **D.** 3 minutes

3. How often should you change your child's toothbrush?
   - **A.** Every month
   - **B.** Every 3 months
   - **C.** Every year
   - **D.** There is no need to change it

4. What is the best age for your child's first dental visit?
   - **A.** At birth
   - **B.** Between 6 months and 1 year
   - **C.** After 6 years
   - **D.** When they feel pain

5. What does dentan plaque mean?
   - **A.** Soft deposits
   - **B.** Hard deposits
   - **C.** I don't know

6. What does dental calculus mean?
   - **A.** Soft deposits
   - **B.** Hard deposits
   - **C.** I don't know

7. What is the importance of adding fluoride to toothpaste?
   - **A.** To prevent caries
   - **B.** To whiten teeth
   - **C.** To clean the mouth
   - **D.** I don't know

Figure 1 Caregiver's level of knowledge questionnaire

8. How does the presence of dental plaque affect oral health?
   - **A.** It causes gum disease
   - **B.** It causes bad breath
   - **C.** It causes discoloration
   - **D.** I don't know

9. Do problems in baby teeth affect permanent teeth?
   - **A.** Yes
   - **B.** No
   - **C.** I don't know

10. Do you think a child's oral health affects their overall health?
    - **A.** Yes
    - **B.** No
    - **C.** I don't know

Results

The demographic characteristics of the study sample are shown in **Table 1.**

The percentage of correct and incorrect answers, as well as the relationship with the sociodemographic characteristics for each question , are shown in **Table 2**. Most questions had a correct response rate above 70%. In contrast, the question about the total number of primary teeth had an incorrect response rate of 97.1%. The two other questions with the highest rates of incorrect answers were: "What is the ideal duration of tooth brushing?" and "What is the best age for your child's first dental visit?" with 85.7% and 74.3% incorrect responses, respectively.

Table 3 and **Figures 2** and **3** show the relationship between the caregiver's level of knowledge and the child's DMFT/ceo-d and OHI scores, indicating no statistically significant relationship between the variables ($p < 0.05$).

TABLE 1
Demographic characteristics of the caregiver/child pair (N=70)

CARACTERISTICS		FREQUENCY	%
CAREGIVER			
Sex	Male	26	37,1
	Female	40	62,9
Edad	18 a 26 years (young)	34	48,6
	27 a 59 year (adult)	36	51,4
	60 years and over (Senior)	0	0
Grado de instrucción	None	7	10
	Primary education	8	11,4
	Secondary education	25	35,7
	Non-university higher educarion	20	28,6
	University education	10	14,3
Nivel socioeconómico	High	7	10
	Upper-middle	14	20
	Middle	20	28,6
	Lower-middle	21	30
	Low	8	11,4
CHILDREN			
Sexo	Male	35	50
	Female	35	50
Edad	3 years	16	22,9
	4 years	16	22,9
	5 years	11	15,7
	6 years	27	38,6

TABLE 2 Relationship between sociodemographic characteristics and caregivers' level of knowledge

QUESTIONS	CORRECT ANSWERS	INCORRECT ANSWERS	P-VALUE (CHI-SQUARE TEST / FISHER'S EXACT TEST)			
			Sex	Age	Education level	Socioeconomic level
What is the total number of primary teeth in a child?	2 (2.9%)	68 (97.1%)	0.135*	0.493*	0.091*	0.287*
What is the ideal duration of tooth brushing?	10 (14.3%)	60 (85.7%)	0.483*	0.085*	0.270*	0.812*
How often should you change your child's toothbrush?	59 (84.3%)	11 (15.7%)	1.000*	0.378	0.619*	0.891*
What is the best age for your child's first dental visit?	18 (25.7%)	52 (74.3%)	0.190	0.684	0.666*	0.122*
What does dental plaque mean?	49 (70.0%)	21 (30%)	0.666	0.676	0.510*	0.974*
What does dental calculus mean?	59 (84.3%)	11 15.7%)	1.000*	0.378	0.470	0.231*
What is the importance of adding fluoride to toothpaste?	55 (78.6%)	15 (21.4%)	0.143	0.454	0.165*	0.166*
How does the presence of dental plaque affect oral health?	56 (80%)	14 (20%)	0.621	0.632	0.006*	0.087*
Do problems in primary teeth affect permanent teeth?	69 (98.6%)	1 (1.4%)	1.000*	1.000*	0.643*	0.100*
Do you think a child's oral health affects their overall health?	66 (94.3%)	4 (5.7%)	1.000*	0.615*	0.206	0.010*

Statistical significance level: $p < 0.05$, *: Fisher's exact test. Bold values indicate statistical significance.

TABLE 3
Relationship between caregivers' level of knowledge and children's DMFT/ceo-d and OHI

VARIABLES	MEAN SCORE (SD)	CLASSIFICATION	FREQUENCY	%	P-VALUE
Caregiver's level of knowledge	7.27 (±1.15)	Low	0	0.00%	
		Medium	41	58.6%	
		High	29	41.4%	
Child's DMFT/ceo-d	2.24 (±1.82)	Very low	29	41.4%	0.443*
		Low	11	15.7%	
		Moderate	23	32.9%	
		High	6	8.6%	
		Very high	1	1.4%	
Child's OHI	5.30 (± 5.49)	Poor	19	27.1%	0.238**
		Good	41	58.6 %	
		Fair	9	12.9 %	
		Excellent	1	1.4%	

SD: Standard deviation; * Spearman correlation – caregiver's level of knowledge vs. child's DMFT/ceo-d; **caregiver's level of knowledge vs. child's OHI.

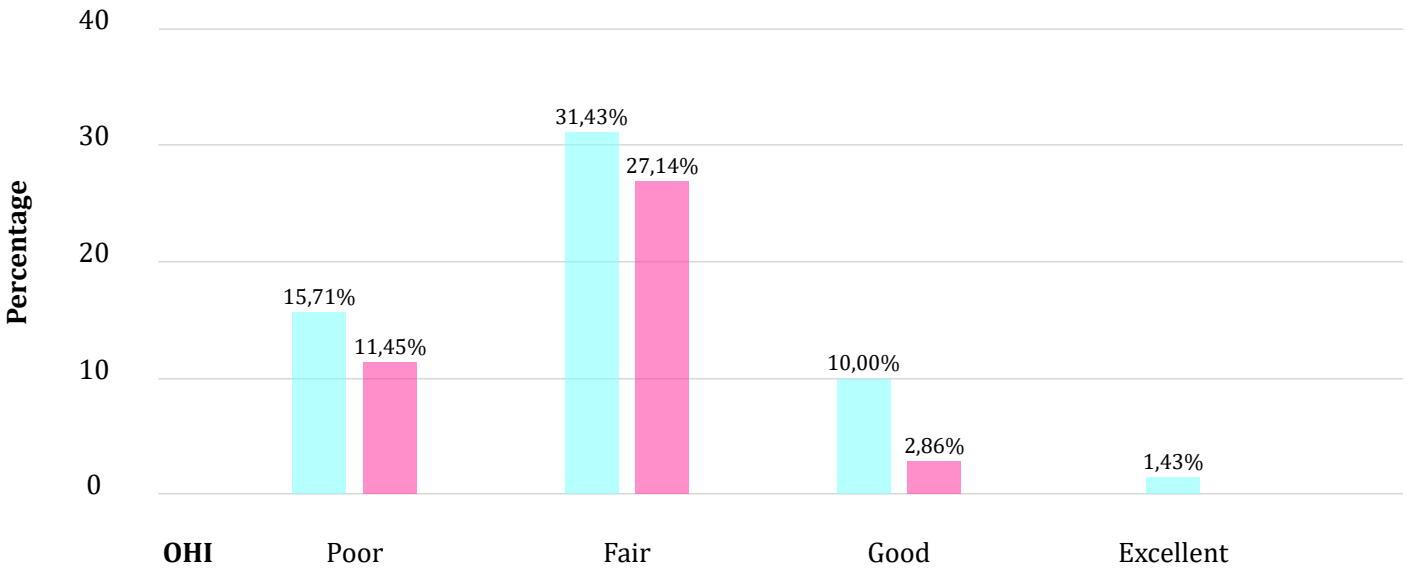

Figure 2 Children's OHI according to the caregiver's level of knowledge: HIGH MEDIUM LOW

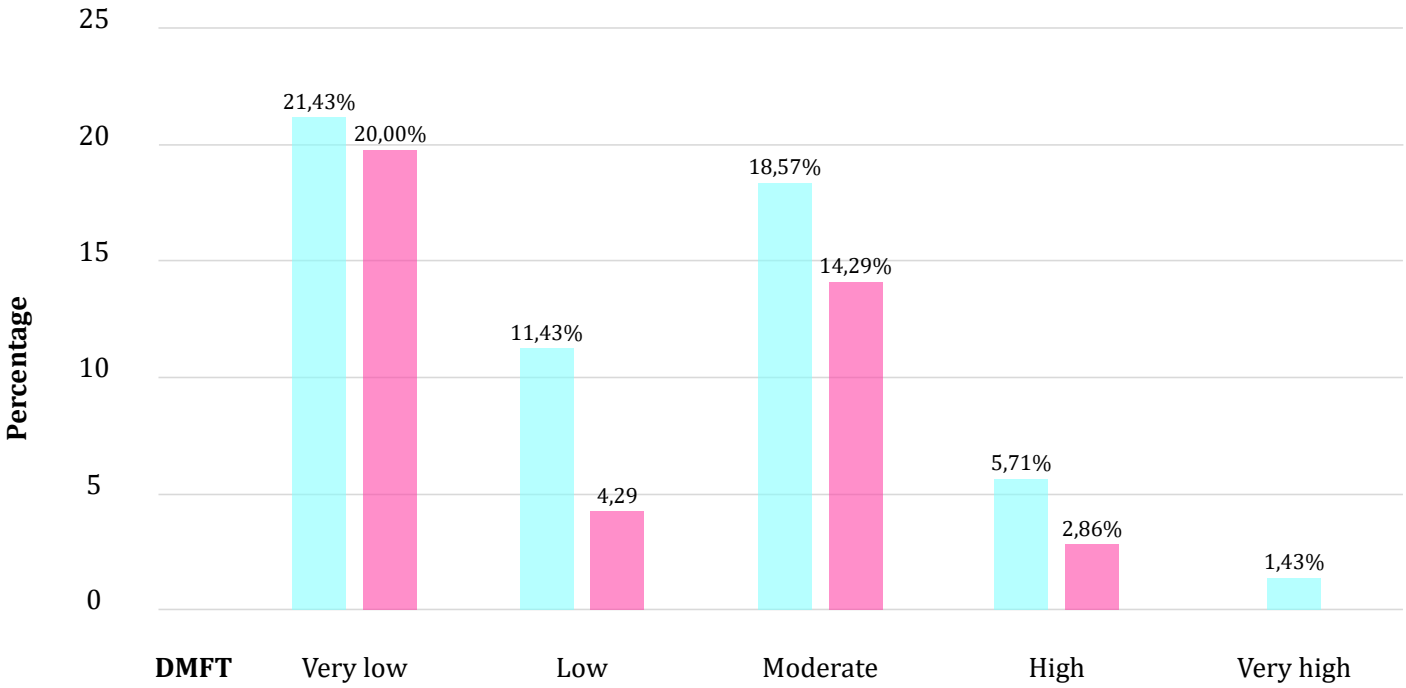

Figure 3 Children's DMFT according to the caregiver's level of knowledge: HIGH MEDIUM LOW

Discussion

Since caregivers spend more time with the children under their care, they are directly involved in shaping their habits. Several studies have shown a correlation between guardians' level of knowledge and the presence of dental caries and oral hygiene indices in children.[18,19]

In this study, more than 70% of caregivers were unable to correctly identify the number of primary teeth in children, the duration of tooth brushing, and the best age for a first dental visit. These results are consistent with those reported by Hamasha et al.[17] who found a similar lack of knowledge in response to these questions. Likewise, in the study by Alshammari et al.[20] 83.2% of participants answered incorrectly when asked about the best time to visit the dentist.

When asked about how often to replace a toothbrush, the percentage of correct responses in our study (84.3%) was much higher than that reported by Nepaul et al. (62.5%)[21] and another similar study.[17]

Regarding knowledge about dental plaque and calculus, as well as how plaque affects oral health, more than 70% of respondents answered correctly, a figure significantly higher than that reported in a previous study.[17]

With regard to the importance of adding fluoride to toothpaste, 78.6% of respondents in our study answered correctly. These results are comparable to those found by Nassar et al.[22] who reported a similar response rate of 74.1%. However, Hamasha et al.[17] and Sehrawat et al.[23] observed lower rates of 46.3% and 43.0%, respectively.

Furthermore, in our study, when caregivers were asked about the impact of primary teeth on permanent teeth, nearly all respondents (98.6%) answered correctly. This figure is higher than that reported by Patil et al. (49%),[24] Mehta N et al. (32.7%),[25] and Dikshit et al. (47.6%).[26] Addressing caregivers' understanding of the importance of primary teeth is crucial, as a study by Suma et al.[27] concluded that a lack of knowledge in this area could increase the risk of dental caries by 1.67 times.

Currently, there is a growing emphasis on recognizing oral health as an integral part of general health, where changes in oral status can affect an individual's systemic health.[28] Despite its importance, this concept is not sufficiently addressed in questionnaires assessing knowledge, attitudes, and practices related to oral health. In our study, nearly all respondents (94.3%) correctly identified this relationship.

This study found an association between caregivers' level of knowledge and their level of education, specifically in response to the question about how dental plaque affects oral health. These results are in line with the findings of Chen et al.[29] who reported that parents with higher levels of education tend to have better oral health knowledge. Similarly, a relationship was observed between caregivers' knowledge and socioeconomic status in the question about children's oral health and its impact on general health. This aligns with findings by Rojas-Briceño et al.[12] who reported that untreated dental caries are more prevalent among economically disadvantaged children. Additionally, our study found no differences in the level of knowledge based on the gender of the caregivers—results that contrast with those reported by Rajeh,[30] who concluded that female caregivers had better knowledge of oral health.

This investigation did not find a relationship between caregivers' level of knowledge and children's caries experience or oral hygiene index. This may be explained by findings from Abduljalil et al.[31] who noted that while parents may have a reasonably good level of knowledge, this does not always translate into effective oral health care practices for their children. It is also important to consider that caregivers were surveyed prior to a dental appointment at a health center, which may mean that the children's oral health needs were already being met through routine treatment, regardless of the caregiver's level of knowledge.

One of the limitations of this study is the lack of research involving populations similar to ours. As a result, comparisons with other studies may be influenced by geographical and cultural factors.

Conclusions

Caregivers in the study sample generally demonstrated a medium level of knowledge regarding oral care. Additionally, the children's DMFT/ceo-d and OHI scores were very low and good, respectively. No differences were found in caregivers' level of knowledge based on the sociodemographic characteristics studied, nor was any association observed with the children's oral health status.

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Ethics Committee approval

The study was approved by the Research Ethics Committee of the University of San Martín de Porres, under code No. 001-2024-CEI/FO-USMP.

Data availability

All data supporting the findings of this study have been included in the article

Conflict of interest statement

The authors declare that they have no conflicts of interest.

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