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ORIGINAL ARTICLE

Socioeconomic factor in relation to oral health in students of a Peruvian rural area

Relación entre factores socioeconómicos y salud bucal en estudiantes de una zona rural peruana

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ABSTRACT

Introduction: The oral health of students from rural areas is a priority public health problem in Peru. **Objective**: To determine socioeconomic factors in relation to oral health in students from a rural Peruvian area. **Methods**: Descriptive cross-sectional observational study. The sample consisted of 604 students from a rural Peruvian area selected for convenience, meeting criteria of inclusion and exclusion, following ethical standards in scientific research. Socioeconomic factors were assessed using a structured questionnaire and the oral health using an epidemiological record with the indicators: DMFT index, Significant Caries Index (SiC), Simplified Oral Hygiene Index (OHI-S), Index of clinical consequences of untreated dental caries (PUFA). The evaluation was performed with natural light by calibrated observers. The data was analyzed in the program STATA 14 through frequency distribution tables and graphics. The relationship of each of the socioeconomic factors with the experience of dental caries was evaluated by the simple binary logistic regression tests. **Results**: The prevalence of dental caries was 85, 26 % (DMFT = 6, 60 SiC=7, 23). The most frequent oral hygiene condition was regular, the prevalence of untreated tooth decay was 61.75 %. **Conclusions**: The level of illiterate instruction, family responsibility and independent parental occupation showed a statistically significant association with their children's dental caries experience in a rural Peruvian area. ($p < 0.001$).

Keywords: oral health; dental caries; rural population; students; epidemiology; socioeconomic factors; dental public health; Perú; Latin America. (MeSH)

RESUMEN

Introducción: La salud bucal de los estudiantes de zonas rurales es un problema prioritario de salud pública en el Perú. **Objetivo**: Determinar la relación entre factores socioeconómicos y salud bucal en estudiantes de una zona rural peruana. **Métodos**: Estudio observacional, descriptivo, de corte transversal. La muestra estuvo conformada por 604 estudiantes de una zona rural peruana, los que fueron seleccionados por conveniencia. Se evaluaron los factores socioeconómicos mediante un cuestionario estructurado y la salud bucal a través de una ficha epidemiológica con los indicadores: Índice CPOD, índice de significancia de caries dental (SIC), índice de higiene oral simplificado (IHO-S), índice de consecuencias clínicas de caries no tratadas (PUFA), la evaluación fue realizada con luz natural por observadores calibrados. Los datos se analizaron en el programa STATA v.14 mediante tablas de distribución de frecuencias y figuras. La relación de cada uno de los factores socioeconómicos con la experiencia de la caries dental se evaluó mediante pruebas de regresión logística binarias simples.
Resultados: La prevalencia de caries dental fue de 85,26 % (CPOD = 6,60, SIC = 7,23) y la prevalencia de caries dental no tratada fue 61,75 %. La condición de higiene oral más frecuente fue regular. **Conclusiones**: El nivel de instrucción analfabeto, la responsabilidad familiar y la ocupación independiente de los padres mostraron asociación estadísticamente significativa con la experiencia de caries dental de sus hijos en un área rural peruana ($p < 0,001$).

Palabras clave: salud bucal; caries dental; población rural; estudiantes; epidemiología; factores socioeconómicos; salud pública bucal; Perú; América Latina.

INTRODUCTION

The burden of oral diseases and chronic conditions that result from it is high worldwide.[1] World Health Organization (WHO) mentions that between 60 % and 90 % of schoolchildren have carious lesions.[2] Inadequate oral health has consequences that alter the student's quality of life.[3]

Education and health are fundamental rights and are closely related, an adequate education will allow developing skills, values and attitudes for students to have a healthy life. On the other hand, health problems cause children to stay away from school for a long time. In other cases, children have to temporarily interrupt their education to care for sick parents or siblings.[4,5]

Currently, chronic diseases are on the rise many of which are attributed to people's lifestyles, these behaviors being acquired mostly in childhood and adolescence hence the need to promote healthy schools that allow the acquisition of personal skills and social factors that lead to the creation of positive values and attitudes towards health.[6,7]

The Ministry of Health of Peru (MINSA) through the health promotion program in educational institutions, it strengthens health promotion through the joint effort of schoolchildren, teachers, parents and the educational community in order to promote healthy behaviors.[8] Oral health in Peru has improved in recent years, but there are still gaps in the provision of services between the rural and urban population, within which we find the lack of infrastructure and equipment, poor organization and management of health facilities of the first level of attention, underutilization of the existing public offer, low or no human resources and poorly paid.[9,10]

The Pan American Health Organization (PAHO) positions Peru as one of the countries with the highest prevalence of dental caries in the Americas region, according to the 2002 study by the Oral Health Strategy of the Ministry of Health of Peru, the prevalence of dental caries and periodontopathies in schoolchildren aged 6 to 12 years is 90 % and 85 % respectively.[11]

The objective of the study was to determine socioeconomic factors in relation to oral health in students from a rural Peruvian area.

METHODS

Design of observational, descriptive cross-sectional study. The sample consisted of 604 schoolchildren of both sexes, belonging to two schools (IE Institución Educativa in

Spanish - IE Andres Bello and IE Nuestra Señora de las Mercedes), from the Pilcomayo district, Huancayo province, Junín department, Peru, during the months of October to November 2017.

To determine the prevalence was established by the number of cases of dental caries,[12] the experience of dental caries was calculated using the DMFT index,[13] referring to the degree of severity the dental caries significance index (SIC)[14] was used. Oral hygiene condition was estimated using the Simplified Oral Hygiene Index (OHI-S),[15] the clinical consequences of untreated caries were evaluated by the PUFA index (arithmetic sum of dental pieces with pulp (P) involvement, ulceration (U), fistula (F) and tooth abscess (A).[16]

The socioeconomic factors were evaluated through a survey directed towards the parents, the variables studied were: education of the father and education of the mother (educational level concluded by the father / mother who was living with the child), occupation (main activity of the head of the household), family responsibility (person in charge of family support) and family burden (number of economically dependent children living in the home).

The instruments were validated in a pilot study with a group of schoolchildren with similar characteristics, making the necessary corrections, for the collection of data a dental clinical record was prepared. The inclusion criteria were: belonging to the selected educational institutions, signed informed consent and assent**,** the exclusion criteria were: presence of any systemic disease that prevents the evaluation of the school, for the collection the indications of the WHO were followed.[17]

Calibration by examiners

The two evaluators were subjected to calibration and concordance tests, and the results were submitted to the Cohen Kappa index to establish the agreement between the observers, obtaining the value 0.90 ($p < 0.05$).

Statistical analysis

The data were analyzed in the Microsoft Excel program and subsequently the statistical quantification was performed using the statistical package STATA 14, for the descriptive analysis we obtained percentages and frequency measurements, average scores and standard deviations of the variables. The relationship of each of the socioeconomic factors with the experience of dental caries was evaluated by the simple binary logistic regression tests.

Ethics approval

The present study complies with the ethical principles of the Helsinki declaration, it also had the approval of an ethics committee, schoolchildren were previously consulted about

their willingness to participate in the investigation by signing the agreement in schoolchildren under 12 years of age and informed consent from their parents, explaining what it was and the possible benefit it would bring since the results obtained would be shared with the parents to take actions regarding the oral health of their children.

RESULTS

604 students were included, the average age was 12.07 years (SD = 3.59). The sample distribution consisted of 317 women (52.50 %) and 287 men (47.50 %) (Table 1).

Table 1 - Characteristics of the selected sample by age and sex

Age	Sex				Total	
	Male		Female			
	n	%	n	%	n	%
6	27	4.47	21	3.47	48	7.90
7	24	3.97	21	3.47	45	7.50
8	22	3.64	15	2.48	37	6.10
9	28	4.63	26	4.30	54	8.90
10	14	2.31	23	3.80	37	6.10
11	16	2.64	19	3.14	35	5.80
12	21	3.47	19	3.14	40	6.60
13	17	2.81	27	4.47	44	7.30
14	30	4.96	28	4.63	58	9.60
15	37	6.12	49	8.11	86	14.2
16	28	4.63	36	5.96	64	10.6
17	15	2.48	23	3.80	38	6.30
18	8	1.32	10	1.73	18	3.00
Total	287	47.50	317	52.50	604	100

A prevalence of dental caries of 80.84 % and 89.28 % was found in male and female students respectively, the experience of dental caries was high (6.60) according to the WHO criteria and a severity of dental caries (7.13) (Table 2).

Table 2 - Prevalence, experience of dental caries in students of a Peruvian rural area

Sex	Prevalence n (%)	Tooth decay $\bar{x}$ (SD)	Tooth lost $\bar{x}$ (SD)	Tooth sealed $\bar{x}$ (SD)	DMFT $\bar{x}$ (SD)	SiC $\bar{x}$ (SD)
Male (n = 287)	232 (80.84)	5.81(4.71)	0.28(0.76)	0.25(0.94))	6.35(4.96)	6.69 (1.9)
Female (n = 317)	283 (89.28)	6.11(4.36)	0.29(0.89)	0.40(1.51))	6.82(4.72)	7.58 (1.5)
Total (n = 604)	515 (85.26)	5.97(4.53)	0.29(0.83)	0.33(1.27))	6.60(4.84)	7.13 (1.8)

Regarding the clinical consequences of untreated caries, there was a higher prevalence in females 205 (33.94 %) compared to males 168 (27.81 %), pulp involvement was the most frequent (41.71 %) of those that presented clinical consequences (Table 3).

Table 3 - Clinical consequences of untreated caries of an urban rural area

Sex	P		U		F		A		PUFA	
	$\bar{x}$ (SD)	n (%)	$\bar{x}$ (SD)	n (%)	$\bar{x}$ (SD)	n (%)	$\bar{x}$ (SD)	n (%)	$\bar{x}$ (SD)	n (%)
Male	0.65 (0.95)	110 (18.21)	0.08 (0.27)	23 (3.80)	0.04 (0.20)	16 (2.64)	0.06 (0.24)	19 (3.14)	0.84 (1.28)	168 (27.81)
Female	0.73 (0.96)	142 (23.50)	0.10 (0.33)	30 (4.96)	0.05 (0.25)	13 (2.15)	0.07 (0.29)	20 (3.31)	0.96 (1.33)	205 (33.94)
Total	0.69 (0.96)	252 (41.71)	0.09 (0.30)	53 (8.76)	0.05 (0.23)	29 (4.79)	0.06 (0.27)	39 (6.45)	0.91 (1.31)	373 (61.75)

Regarding the oral hygiene condition, the majority presented a regular oral hygiene condition 350 (57.9 %), followed by the bad oral condition 174 (28.8 %) and the good condition 80 (13.2 %) (Fig. 1).

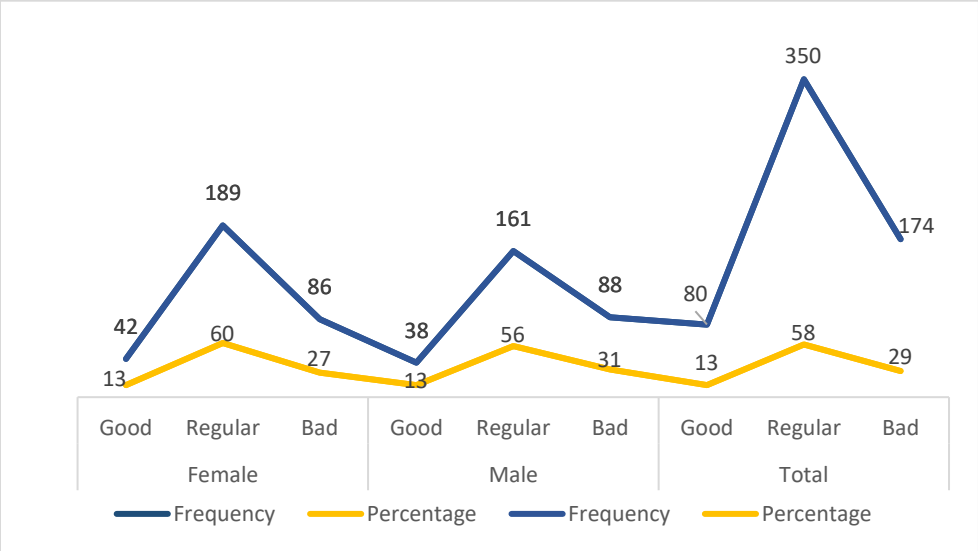

Fig. 1 - Oral Hygiene condition in students of a rural Peruvian population

In relation to socioeconomic factors, the degree of illiterate instruction in both the father and the mother and the family responsibility of the parents showed statistically significant association with the experience of dental caries (EDC), independent occupation is a risk factor (p = 0.001) for EDC, observing that children whose parents work independently are 2.45 times more likely to have HCD than those whose parents work dependently (Table 4).

Table 4 - Socioeconomic factors according to the experience of dental caries in students of a Peruvian rural area

Socioeconomic factors	Dental caries experience						
	Present (n = 515)		Absent (n = 89)		IC del 95 %		
	n	%	n	%	OR	IC	Value *p*
Father education							
Illiterate	19	82.60	4	17.40	1.00	(0,86-1,08)	0,001*
Primary education	78	86.66	12	13.34	0.82	(0,57-1,05)	0,574
Secundary education	266	86.64	41	13.36	0.57	(0,34-0,75)	0,473
Technical education	44	81.48	10	18.18	0.43	(0,31-0,58)	0,542
Higher education	33	75.00	11	25.00	0.45	(0,25-0,65)	0,051
Mother education							
Illiterate	33	78.57	9	21.43	1.00	(0,76-1,28)	0,001*
Primary education	92	80.00	23	20.00	1.02	(0,77-1,31)	0,981
Secundary education	235	88.34	31	11.66	0.97	(0,64-1,08)	0,883
Technical education	60	81.08	14	18.92	0.89	(0,79-0,99)	0,881
Higher education	16	41.02	23	58.98	0.81	(0,73-0,89)	0,071
Occupation							
Dependent	169	87.11	25	12.89	1.00	(0,87-1,08)	0,211
Independent	301	89.05	37	10.95	2.45	(1,51-3,51)	0,001*
Housewife	34	77.27	10	22.73	1.07	(2,34-3,74)	0,059
Others	29	70.73	12	29.27	1.79	(1,16-2,42)	0,233
Family responsability							
Father	190	84.82	34	15.18	1.01	(0,86-1,04)	0,001*
Mother	152	90.47	13	9.53	1.78	(1,18-2,37)	0,001*
Father and mother	147	89.09	18	10.91	1.00	(0,87-1,08)	0,341
Other	13	65.00	7	35.00	0.45	(0,25-0,65)	0,211
Family burden							
$\bar{x}$ (DS)	2.48 + 1.53		2.35 + 1.56		1.08	1.10	0.415

*significant difference.

DISCUSSION

Inadequate oral health affects the integral development of schoolchildren, which increases the risk of absenteeism and school delay even more in students of rural origin, the study shows a high prevalence of dental caries being higher than reported by *Farooqi* FA *et al*. (73 %)[18] in schoolchildren from a rural community in India, *García R et al*. (25.91 %)[19] in schoolchildren in rural communities of Sinaloa-Mexico, *San Martin E et al*. (20.2 %)[20] in schoolchildren from the rural community of Ayangue-Ecuador, *Akinyamoju CA et al*. (12.2 %)[21] in schoolchildren in rural communities in south-western Nigeria and below *Aquino C et al*. (95.6 %) [22] in schoolchildren from a rural Peruvian community. The etiology of dental caries is multifactorial, within which social determinants such as socioeconomic status may increase the risk of developing carious lesions.[23]

In relation to the experience of dental caries, this was greater than reported by *Aquino C et al*. (5.79),[22] *Ferrazzano GF* (1.17),[24] *Kumar S et al*. (4.82),[25] in addition the study evidenced the small amount of sealed teeth, this is due to the lack of access to health services.

More than half of the students from 6 to 18 years of age had clinical consequences of untreated caries, being greater than that reported by *Carrasco-Loyola M et al*. (25.71 %),[26] *Narang et al*. (22 %)[27] and less than reported by *Mota-Veloso I et al*. (64.6 %),[28] the main component was the pulp commitment contributing with more than 67 % of the PUFA index, which can trigger the partial or total infection of the dental pulp (pulpitis) and in more extreme cases the dental loss leading to a greater economic expense of the parents and more time for the rehabilitation of the schoolchild, the high presence of lesions associated with untreated dental caries exemplifies the lack and poor distribution of human resources and inputs in Peruvian rural areas.[29]

Regarding the oral hygiene condition, it was mostly regular, which is consistent with *Barros VA et al*., [30] *Freitas L et al*,[31] regarding sex, showed that women had better oral health according to *Akinyamoju CA et al*.,[21] This may be because women are more concerned about their oral health as opposed to men, according to the study by *Furuta M et al*.,[32] Women had almost twice as many dental check-ups in the year as opposed to men. In addition, they scheduled their appointments according to the treatment recommended in these check-ups and have better health indicators. [32]

That is why the teaching of an adequate dental brushing technique in educational institutions, this would allow maintaining adequate oral hygiene for healthy students and improve the oral condition in what already have gingival inflammation.[33]

The study showed that students of parents who had a lower level of instruction had more carious lesions, which is consistent with *Chaffee BW et al*.,[34] the educational level of parents positively influences the teaching-learning process of their children on the care of their oral health.[35]

Regarding family responsibility, the fact that parents work on the oral health of their children, which differs with *Mattos M*,[36] *Gaeta M et al*.,[37] this may be due to the time they dedicate to work, which limits their interaction with their children about oral health care.

Regarding the work condition, the independent one showed a relationship with the experience of dental caries, the progressive incorporation of women into work activity, means that the education of their children is increasingly focused on educational institutions, so that promotion of programs for the promotion and prevention of oral diseases are a priority even more for students of rural origin. [38]

In conclusions, the level of illiterate instruction, family responsibility and self-employed parents showed a statistically significant association with the dental caries experience of a Peruvian rural area.

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Conflict of interests

The authors declare no conflict of interest in relation to published results.

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