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PREVALENCE OF DENTAL CARIES IN THE FIRST MOLARS IN SCHOOLCHILDREN IN THE MUNICIPALITY OF DURANGO AND ITS RELATIONSHIP WITH SOCIOECONOMIC FACTORS

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Abstract: Dental caries has been a serious public health problem, physically affecting the first permanent molars in the population of children over 5 and under 13 years of age. The first permanent molars are the dental organs most affected by dental caries due to their high susceptibility, this dental organ being a key piece in the growth and development of the stomatognathic apparatus, as well as the masticatory function in the individual.

Epidemiological studies have been carried out on specific population groups, trying to identify the characteristics and knowledge that cause the disease through an analysis of the frequency and distributions of health determinants and risk factors of the study population. In addition to these studies, observational, descriptive and cross-sectional research is designed to identify the prevalence of a disease and its related factors in a specific population. This way, there is a reference of the social, economic and health conditions of said population, allowing the implementation of strategies in the planning areas of the health departments, designed by professionals and researchers interested in generating new knowledge about the characteristics of health of the population studied.

The purpose of this research work is to identify the prevalence of dental caries in the first permanent molars in children from 6 to 12 years of age and its relationship with socioeconomic factors.

An observational, descriptive and cross-sectional epidemiological study was carried out, in which a sample of 244 schoolchildren of both sexes, between 6 and 12 years of age, in an area of influence of the Bosques del Valle Health Center in the Durango city.

The prevalence of caries in the study sample was 66.8%. The risk factors that were significantly associated with caries in the multivariate analysis ($p < 0.05$) were the level of crowding and gender; being the female sex the one with the highest prevalence of caries. Socioeconomic factors were not significantly related to molar caries disease; however, they were considered in the multivariate analysis together with other variables, which allowed us to find some of them significantly related to the ordinal variable dependent on the clune index, which is a indicator of dental caries disease. In addition, parental knowledge about caries was significantly associated with the frequency of the disease, so it is concluded that this factor allows reducing the prevalence of caries.

Keywords: Prevalence, dental caries; socioeconomic factors; first permanent molar; children.

INTRODUCTION

Since the year 1,000 B.C. Dental caries appeared in human beings, today it is considered worldwide as the main cause of oral morbidity in man, it is also the first cause of dental consultation and it is located in fourth place among the diseases that have the highest costs of treatment. treatment has (Salazar, 2018).

There are factors that influence the human being for its appearance such as age, eating habits and oral hygiene, educational level, socioeconomic status, employment, religion, genetics, its poor position in the dental arches, etc. (Salazar, 2018).

The World Health Organization (WHO) reports that in Mexico 93% of the population under 15 years of age suffer from it, it is the main cause of tooth loss at an early age and the first permanent molars are the dental organs that are most affected. they lose (Hernández, 2017).

Dental caries is considered a public health problem due to its high prevalence and worldwide incidence, since the greatest burden of dental caries is found in socially marginalized populations and in conditions

of poverty (Mattos, 2010).

When it occurs in children aged 6-12 years, it must be taken into account, since it is a time when very important transformations take place, such as dental replacement or change of teeth and neuromuscular and intellectual development. that entails Parents are the ones who have the mission of caring for their children's oral health, since at these ages children cannot understand or assimilate the information and knowledge necessary to adequately comply with their oral health care on their own. (Marquez-Fililu, 2009).

To guarantee the quality of health services, actions and strategies must be applied based on the results of research in our own country and our health system, without copying developed countries, to allow a timely and dynamic response. according to current needs. (Mireles-Zavala, 2008)

The present work is aimed at health research regarding the problem of dental caries and socioeconomic factors related to this health problem.

The objective will be to determine the prevalence of dental caries in the first permanent molars of children from 6 to 12 years of age in schools in the area of influence of the Bosques del Valle Health Center (CSBV), dependent on health jurisdiction No. 1 of the Health Services. Health of Durango, Mexico, and analyze the relationship that exists with socioeconomic factors.

BACKGROUND

Children are highly vulnerable to health problems in general and dental caries is no exception, since it is considered a public health problem and a communicable, infectious, but also chronic disease fully related to various factors such as oral hygiene. defective, high sugar intake, nocturnal feeding, low socioeconomic level of the parents and bacterial colonization. This can present serious consequences such as mild to intense pain, dental and facial infections, admissions to the emergency room, hospitalizations, as well as diminished physical development of the infant, high-cost treatments, and decreased quality of life. Attributes and characteristics that give a certain degree of susceptibility to child patients, constituting a probability that can be measured with predictive value, and that when modified or changed will provide advantages for individual, group or community prevention (Aguilar-Ayala et al, 2014).

For example, the UN declaration, which was approved by the United Nations General Assembly on November 20, 1989, where it expresses on the rights of children, that States are obliged to adopt administrative, legislative and other measures nature, to enforce respect for economic, social and cultural rights, appropriate to recognize the children of their territory as subjects of law and protect them (ONU, 1989).

There is little research on the relationship between dental caries and socioeconomic factors. Various authors have addressed the issue and research has found higher rates of prevalence and incidence of dental caries in children of low socioeconomic status (Franco et al., 2004). The variables most frequently used to determine socioeconomic status are: sex, age, religion, family income, occupation, and parental education (Bronfman et al., 1988).

MATERIAL AND METHODS

An observational, descriptive and cross-sectional epidemiological study was carried out, in which a sample of 244 schoolchildren of both sexes, between 6 and 12 years of age from the municipality of Durango, was clinically assessed during the 2015-2016 school year. enrolled in ten primary schools in the area of influence of the Bosques del Valle Health

Center (CSBV), of the sanitary jurisdiction No. 1 of the Health Services in the State that were randomly selected (Murrieta-Pruneda, 2013; Daniel, 2014).

SAMPLE SIZE

From a study population of 3043 school boys and girls from the area of influence of the Bosques del Valle Health Center, a representative sample of the study population was taken. The calculation of the sample size was carried out using the estimation formula for the proportion of a population

finite (Daniel, 2014).

$$n = \frac{Z^2 pqN}{Nd^2 + Z^2 pq} = 244$$

Where:

N= Study population (3,043 schoolchildren)

Z= 95% confidence level = 1.96

d= Precision of the estimation 5% = 0.05

p = Proportion of subjects with the characteristic of interest (78%). p= 0.78, Caries

dental care in children in Mexico, (SINAVE, 2011).q = 1 – p = 22% =.22 (complement of the proportion).

n= sample size = 244 children (Daniel, 2014).

With this information, a sampling frame was created to select the sample, therefore, the proportion of schoolchildren of each age group was determined and with this the percentage and number of selected children was obtained, according to their age for the study.

The representative sample of the study population was taken from primary schools in the area of influence of the CSBV, the sampling frame was completed, but with the number of children in each age group.

CRITERIA

Inclusion criteria.

- Children of indistinct gender from 6 to 12 years old who wished to participate voluntarily in the study.
- Primary school students in the area of influence of the Health Center
- Valley Forests
- With prior signing of a letter of informed consent by the parents, guardians or legal representatives.
- Exclusion criteria
- Boys and girls with a previous history of orthodontic treatment.
- Children who did not have erupted first permanent molars.
- Children with moderate or severe physical and/or mental disabilities.
- Elimination criteria
- Children who voluntarily withdrew from the study

INFORMATION COLLECTION

The study was applied to 244 children randomly selected from ten primary schools in the area of influence of the Bosques del Valle Health Center.

The information obtained from the oral examination of the children was collected in the dental clinical record used in the dental service of the CSBV, the measurement was made in randomly selected children and the Clune index was used to measure dental caries in permanent first molars.

A database was created in the SPSS 20 statistical package to process the information obtained.

PROCEDURE

A research protocol was submitted for review and authorization by the Ethics Committee of the UJED Scientific Research Institute.

Permission was requested from the health authorities (Subdirectorate of education and training of the Health Services of Durango and from the director of the CSBV) and

from the school authorities to carry out the investigation.

Meetings were held with authorities from primary schools, parents' associations, and social participation councils to explain the research, and dates were arranged to make it known to teachers, administrative staff, and parents.

Before the oral examination, a standardization was carried out in the clinical criteria and in the social, demographic and economic questionnaire through a pilot test (Juárez-López, 2010).

Both were applied as a validated instrument and were adapted for convenience for the purposes of this study. The oral examination was carried out by direct clinical observation and the questionnaire was applied to the parents in the primary schools.

In the first phase of the study, a meeting was held with parents of the selected elementary schools to publicize the project, clarify doubts, and introduce the staff that would care for the children.

Parents who agreed to participate signed an informed consent letter. A 37-item questionnaire was applied to parents or guardians to measure socioeconomic factors and to characterize the study group sociodemographically.

In the second phase of the study, an oral examination was carried out on the children with a dental examination kit (mouth mirror No.4, dental explorer and healing tweezers), through direct observation, and indirectly using the mouth mirror to detect areas of dental caries; the dental explorer was used to confirm areas of caries in the first permanent molars of children (Murrieta-Pruneda, 2013; Juárez-López, 2010).

In the third phase, the questionnaire was applied to parents or guardians (Juárez-López, 2010).

The information obtained was written according to the Clune index in the initial odontogram of the stomatological clinical history of the oral health program of the Durango Health Secretariat that is used in the CSBV.

STATISTIC ANALYSIS

A descriptive analysis was performed on quantitative variables using mean, standard deviation, and 95% confidence intervals.

Frequency tables were made for qualitative variables using percentages and pie charts.

The comparison between qualitative variables was made through contingency tables and with the Chi-square statistic.

For quantitative variables, the comparison between groups was with the t-student statistic.

An $\alpha \leq .05$ was used as statistical significance.

Since dental caries is a multifactorial disease, a linear regression model was also carried out with some variables of interest.

The data obtained were processed in the statistical package SPSS 20.

ETHICAL CONSIDERATIONS

This study was approved by the H. Ethics Committee of the UJED Scientific Research Institute, "Dr. Roberto Rivera Damm.

In this study, the guidelines of the Helsinki Declaration of the 64th General Assembly, Fortaleza, Brazil, October 2013, were followed.

With the approval of the parents, guardians or legal representatives, after explaining the objective of the research, they signed the informed consent.

(Reyes-Romagosa, 2013; General Health Law, 1984; 59 Helsinki Declaration Assembly, 2008).

The investigation was carried out in compliance with the criteria indicated in article 100 of the General Health Law, which stipulates that this study did not represent any

type of risk for the minors or their parents.

RESULTS

DENTAL CARIES PREVALENCE

A prevalence of dental caries of 66.8% was found in the study sample.

(n=244), see table 1 frequencies and graph 1 percentage

Study groups	Frequency
healthy	81
sick	163
Total	244

Table 1. Prevalence of dental caries in the study sample.

SOCIODEMOGRAPHIC RESULTS

In the study sample, a higher prevalence of patients was found in the female gender (71.3%), while in the male it was (61.1%) of caries, see Table 2.

Gender*	Study groups	Frequency	Percentage
female	healthy	39	28.7
	sick	97	71.3
	Total	136	100
male	healthy	42	38.9
	sick	66	61.1
	Total	108	100

Table 2. Prevalence of dental caries by gender.

* p=0.092 chi-square test

SOCIOECONOMIC RESULTS

In relation to the schooling of the father and the mother, similar means of the years of study were identified between diagnostic groups (10.76 healthy and 10.53 sick in the fathers; and 10.66 healthy, 10.37 sick in the mothers), see the tables 3 and 4.

98% of the houses in the sample presented a good INCOVI, while the rest (2%) presented a regular INCOVI, see Table 5.

INCOVI	Frequency	Percentage
Regular	5	2.0
Good	239	98.0
Total	244	100.0

Table 5. Index of housing conditions of the study sample

Regarding socioeconomic level, 218 cases were identified with a good socioeconomic level, for a percentage of 89.3%, while for a regular socioeconomic level only 2 cases were found, corresponding to 0.9%.

See table 6.

Socioeconomic level	Frequency	Percentage
Regular	5	2.0
Good	239	98.0
Total	220	90.2
Lost by the system	24	9.8
Total	244	100.0

Table 6. Socioeconomic level of the study sample

Table 14 shows the average income. With a minimum of 2,400 monthly to a maximum of 18,000 pesos that enters the home each month, an average income level of 5,930.8 ± 2,689.2 is identified, see table 7.

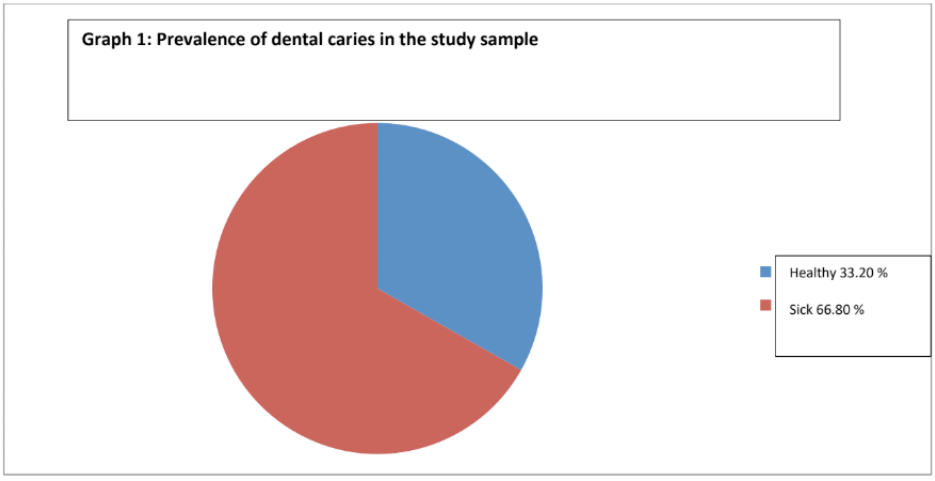
The average monthly income was 5930.80 pesos per month. According to the National Survey of Household Income and Expenses (ENIGH) 2018, the above table places the study sample in the second decile in ascending order, that is, it represents 3.2% of total current income (INEGI, 2018).

In the study sample, the category of employee with the highest percentage (83.7%) in the father's occupation was found, while the highest percentage in the mother's occupation corresponded to the housewife category with a percentage of 50.4%, see graphs 2 and 3.

Regarding the first decayed molars category, the group of patients presented the highest percentage in the response of a

AGE	NUMBER OF CHILDREN IN THE MUNICIPALITY OF DURANGO *	Ratio of children by age	Sample of children by age
6 years	11	14.3%	35
7 years	11	14.2%	34
8 years	11	14.3%	35
9 years	11	14.1%	35
10 years	11	14.7%	36
11 years	11	14.7%	33
12 years	11	14.7%	36
TOTAL	79	100%	244

Sources: * Population and Housing Census (INEGI, Population and Housing Census, 2010). Regions Socioeconomic of Mexico (INEGI) (2010)



Dental cavities	N	Average	Median	Standard deviation	Minimum	Maximum
Healthy	70	10.76	10.00	3.0	3	18
Sick	150	10.53	9.00	2.5	5	21
Total	220	10.60	9.00	2.7	3	21

Table 3. Average years of study of the father in the diagnostic groups.

p=0.598 student t test

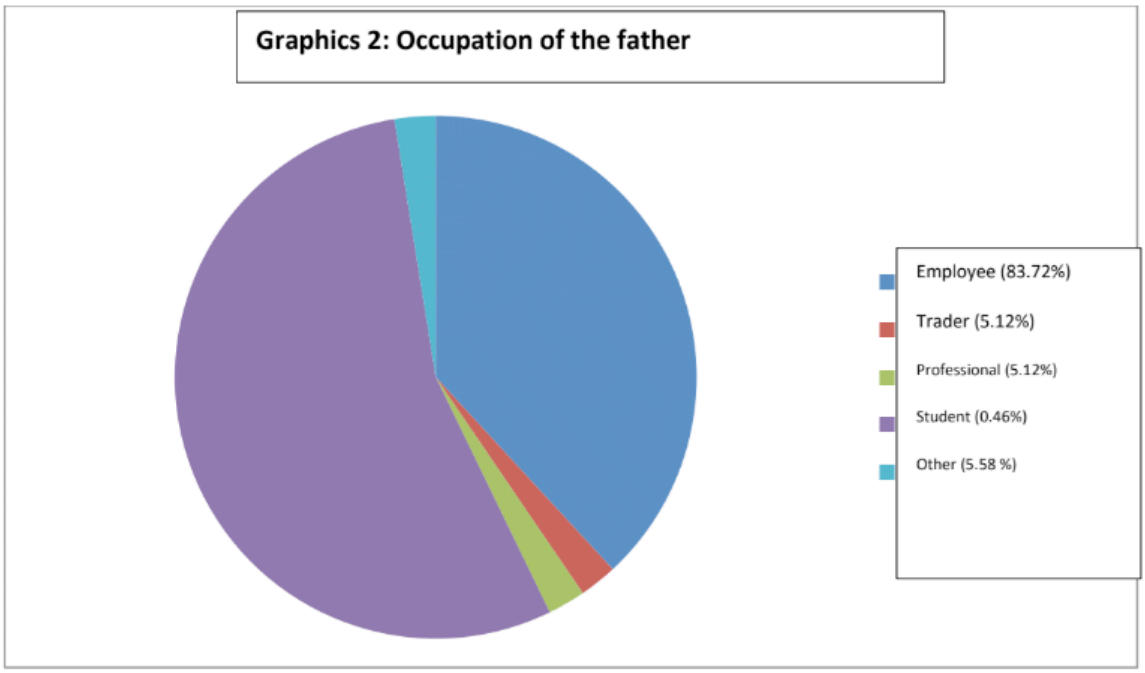
Dental cavities	N	Average	Median	Standard deviation	Minimum	Maximum
Healthy	76	10.66	9.00	3.3	3	19
Sick	158	10.37	9.00	2.3	6	17
Total	234	10.47	9.00	2.7	3	19

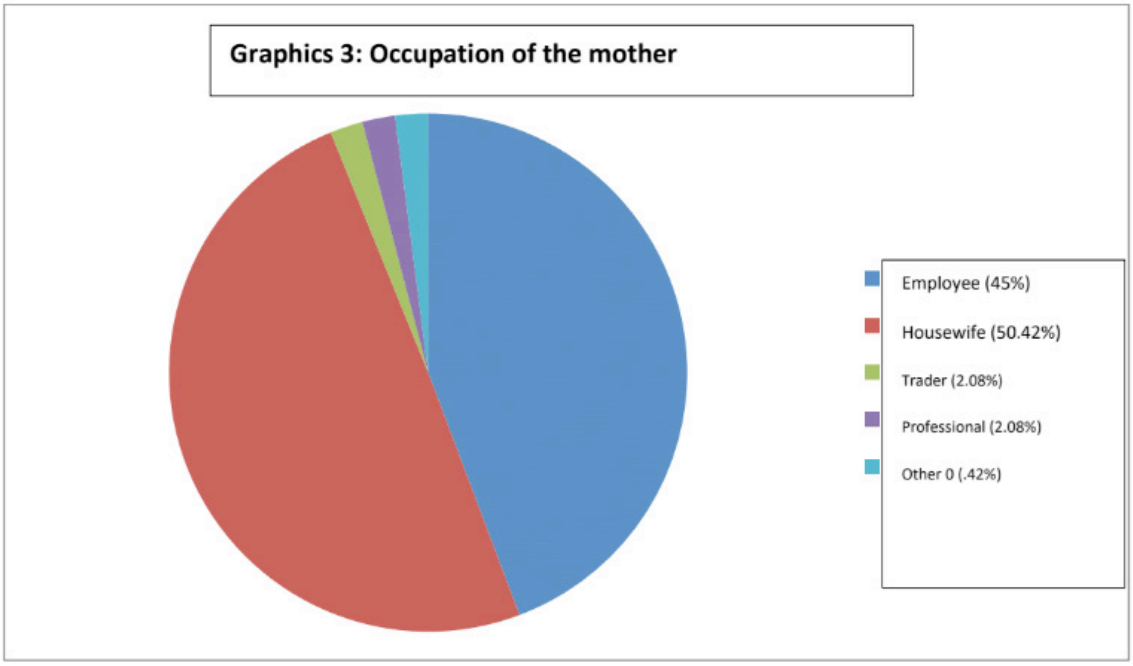
Table 4. Average years of study of the mother in the diagnostic groups.

p=0.510 prueba t-student

	N	Minimum	Maximum	Average	Standard deviation	95% confidence interval
Amount of money coming into the household each month	237	2400	18000	5930.80	2689.28	(5586.66, 6274.95)

Table 7. Monthly household income


Graphics 2: Occupation of the father
Employee (83.72%)
Trader (5.12%)
Professional (5.12%)
Student (0.46%)
Other (5.58 %)


Graphics 3: Occupation of the mother
Employee (45%)
Housewife (50.42%)
Trader (2.08%)
Professional (2.08%)
Other 0 (.42%)

		Dental cavities		Total
		Healthy	Sick	
Number of molars with caries	Non-decayed molar	80	9	89
		98.8%	5.5%	36.5%
	1 molars with cavities	0	91	91
		0.0%	55.8%	37.3%
	2 molars with cavities	1	36	37
		1.2%	22.1%	15.2%
	3 molars with cavities	0	13	13
		0.0%	8.0%	5.3%
	4 molars with cavities	0	14	14
		0.0%	8.6%	5.7%
	Total	81	163	244
		100.0%	100.0%	100.0%

Table 8. Frequencies of the sample with first permanent molars with caries.

Study groups		**N**	**Range**	**Minimum**	**Maximum**	**Average**	**Standard deviation**
Healthy without fillings	Clune's Index	64	.00	40.00	40.00	40.00	.00
Sick	Clune's Index	162	9.50	30.00	39.50	***37.62***	1.60
healthy with fillings	Clune's Index	18	2.50	37.00	39.50	***38.61***	.62

Table 9. Clune index for the study sample.

Parental knowledge about the child's dental health status	Dental cavities		Total
	Healthy	Sick	
The person knows that if he has cavities	20	75	95
	24.7%	46.0%	38.9%
The person knows he doesn't have cavities	29	37	66
	35.8%	22.7%	27.0%
The person does not know	32	51	83
	39.5%	31.3%	34.0%
Total	81	163	244
	100.0%	100.0%	100.0%

Table 10. Parental knowledge about the dental health status of the diagnostic groups.

p=0.004 chi-square test

		Dental cavities		Total
		Healthy	Sick	
Daily brushing frequency	The person does not brush	2	0	2
		2.5%	0.0%	0.8%
	Once a day	22	57	79
		27.2%	35.0%	32.4%
	2 times a day	41	83	124
		50.6%	50.9%	50.8%
	3 times a day	16	23	39
		19.8%	14.1%	16.0%
	Total	81	163	244
		100.0%	100.0%	100.0%

Table 11. Frequency of daily tooth brushing in the diagnostic groups.

p=0.106 chi-square test

Model*			Collinearity Statistics	
	B	Sig.	Tolerance	VIF
(Constant)	37.656	.000		
Age	-.096	.088	.984	1.016
Family monthly income	6.437E-005	.148	.862	1.160
Child's father's education	.057	.242	.684	1.462
Education of the child's mother	-.008	.866	.667	1.499
Gender	.532	**.022**	.940	1.064
Frequency of daily tooth brushing	.247	.148	.904	1.106
Parental knowledge about whether the minor has cavities	.172	.199	.973	1.028
Overcrowding level	.740	**.037**	.827	1.209
INCOVI	-.968	.281	.812	1.231

Table 12. Multiple linear regression model for dental caries and risk variables.

* Multiple linear regression model, dependent variable Clune index.

decayed molar with 55.8%, followed by two molars with decay, see Table 8.

it was identified that in the Clune index the mean of the healthy child without fillings was 37.62 ± 1.6 and the average of the group of children with fillings was 38.61 ± 0.62, the averages being higher than the group of children with the category of patients 37.62 ± 1.6, see table 9.

KNOWLEDGE OF THE STATE OF ORAL HEALTH BY PARENTS AND FREQUENCY OF BRUSHING

Regarding the knowledge of the parents about the oral health status of their children, it was identified that the parents of both study groups the category with the highest percentage was the category they do not know, with 39.5% and 31.3% for the groups of healthy children and sick children respectively, finding statistical significance, see table 10.

In relation to the frequency of daily tooth brushing, the highest percentage was obtained by the category patients with (50.9%) for the response twice a day followed by 37% for the response once a day, although no association was found. statistically significant, see table 11.

MULTIVARIATE RESULTS

According to the previous results, the prevalence of caries is bivariately associated with the father's knowledge about his child's caries, however, the other sociodemographic, socioeconomic and hygiene variables must be analyzed as a whole trying to identify which variables are important. in responses to the Clune index as the dependent variable. The following table shows the results of the multiple linear regression where the variables believed to be related to dental caries from diagnosis are identified, taking the Clune index as the dependent variable.

The results show a statistically significant relationship between the variables gender and level of overcrowding, keeping the other variables constant within the multivariate model of multiple linear regression, see Figure table 12.

DISCUSSION

In the present study, the prevalence of caries found was 66.8%, which is lower than that reported in previous years in Mexico. In a study in Campeche, 80.3% was found (Pérez-Olivares, 2002), a prevalence similar to that obtained by Rodríguez-Rey (2006) who registered 84.2% of caries; but above studies such as that of Oropeza-Oropeza (2012) that found a prevalence of 58.6%; Reyes-Romagosa (2015) and Gómez-Capote (2018) obtained a similar caries prevalence of 40.3%

From the sociodemographic results, it was identified that 66.8% of the sample presented some caries lesion in one of their first permanent molars, with children under 9 and 12 years of age presenting the highest frequency of caries cases with 80% and 72.2%. respectively.

Regarding the sex of the children, it was found that girls are the ones with the most dental caries with a percentage of 59.3%; which agrees with the studies by Rodríguez-Rey (2006), Pérez-Olivares (2002), Oropeza-Oropeza (2012) and Reyes-Romagosa (2013). But they differ from the study carried out by Gómez-Capote et al. (2015), in which they obtained a higher percentage in the male sex with 50.6% of dental caries.

The Clune Index recorded for the diagnostic group patients an average of 37.62 with a standard deviation of ± 1.6, a higher result than the one reported in his study by Rodríguez-Rey (2006) whose average was 34.7.

The linear regression model identified two associated variables

significantly with dental caries, these were

the level of overcrowding and the sex of the child, similar to what was reported by Romo-Pinales et al. (2005) in their study.

The two variables that were statistically significant were the child's age and the mother's schooling, which differs from the study carried out by Hernández-Ortega and Taboada-Aranza (2017) in which the only variable that showed a statistically significant association with caries it was age.

CONCLUSIONS

The prevalence of caries is (66.8%), but it is found

below the national registry (78%) according to SINAVE (2011).

Caries was more frequent in the female gender with a prevalence of 71.3%, ten percentage points more than in boys.

The study sample has similar socioeconomic characteristics, only 84% of the fathers report having an employee status, while 45% of the mothers are employed and 50% are housewives. This employment condition identifies the study sample with an average household income per month close to 6 thousand pesos, which according to the National Survey of Household Income and Expenses of Mexico (ENIGH, 2018) is in the second lowest income decile nationwide.

According to the multivariate analysis in the study sample, variables related to the dental caries condition were identified, these were gender and level of overcrowding, maintaining the Clune index as a dependent variable.

in the multiple linear regression model.

It is necessary to implement campaign strategies to raise awareness about the knowledge of caries and favor the decrease in the prevalence of this dental disease.

Dental caries is a public health problem that must be addressed by health professionals and as a team with the minor's parents for a better response in the effectiveness and achievement of the minor's state of health.