Frecuencia de pulpotomía y factores asociados en niños de una unidad integral odontopediátrica de Chilpancingo, México

Frequency of pulpotomy and associated factors among children in a comprehensive pediatric dentistry unit from Chilpancingo, Mexico.

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Resumen

Introducción: La pulpotomía es uno de los procedimientos para preservar la pulpa cameral afectada en dentición decidua, la cual se estima que tiene una tasa de éxito del 92%. ***Objetivo:*** Estimar la frecuencia de pulpotomía e identificar factores asociados en niños de una unidad integral odontopediátrica de Chilpancingo, México. ***Material y métodos:*** Estudio transversal que recopiló información de 65 expedientes clínicos de niños atendidos durante agosto del 2020 a marzo del 2021. Fue recolectada información sociodemográfica, de vivienda y salud oral como datos de interés. Se tomó en cuenta el antecedente de pulpotomía sobre el órgano dentario tratado. Fue estimada la razón de momios con su intervalo de confianza del 95% como estimador de la fuerza de asociación con el software estadístico de CIETmap. ***Resultados:*** La frecuencia del tratamiento de pulpotomía fue del 37% (24/65). La proporción del tratamiento fue del 67% (16/24) y del 33% (8/24) en las mujeres y hombres, respectivamente. El primer molar inferior temporal derecho fue el más ocurrente al procedimiento con una proporción del 46% (11/24). Fue identificado un factor asociado en sentido de protección, el uso de pasta con flúor (OR=0.08; IC 95%=0.01 – 0.44). ***Conclusión:*** La frecuencia de pulpotomía reportada se encuentra dentro del rango de la literatura. Antes los resultados identificados, la prevención primaria de salud resulta ser imprescindible para crear conciencia en edades tempranas que ayuden a disminuir la experiencia de caries en niños.

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Palabras clave: niños, odontopediatría, caries, diente deciduo, pulpotomía, México (DeCS)

Summary

Introduction: Pulpotomy is one of the procedures to preserve the affected chamber pulp in deciduous dentition, which is estimated to have a success rate of 92%. ***Objective:*** To estimate the frequency of pulpotomy and identify associated factors among children in a comprehensive pediatric dentistry unit from Chilpancingo, Mexico. ***Material and methods:*** A cross-sectional study that collected information from 65 clinical records of children seen from August 2020 to March 2021. Sociodemographic, housing and oral health information was collected as data of interest. The history of pulpotomy on the treated dental organ was taken into account. The odds ratio with its 95% confidence interval was estimated as an estimator of the strength of association with CIETmap statistical software. ***Results:*** The frequency of pulpotomy treatment was 37% (24/65). The proportion of treatment was 67% (16/24) and 33% (8/24) in females and males, respectively. The lower right temporal right first molar was the most common procedure with a proportion of 46% (11/24). An associated protective factor was identified as the use of fluoride paste (OR=0.08; CI 95%=0.01 – 0.44). ***Conclusion:*** The reported frequency of pulpotomy is within the range of the literature. Given the results identified, primary health prevention is essential to create awareness at an early age to help reduce the experience of caries in children.

Key words: children, pediatric dentistry, caries, deciduous tooth, pulpotomy, Mexico. (MeSH)

Introduction

Dental caries is the most frequent cause of pulp pathologies in deciduous teeth and is the main reason for their deterioration and loss. The histopathological characteristics of the dental pulp, the brevity of its life cycle, the relative size of the pulp chambers, favor rapid pulp involvement and allow the infectious process to progress rapidly to necrosis. This has led to the development of numerous procedures and different therapeutic offers to maintain the affected dental organs.(1)

The main objective of pulp treatment in the primary and young permanent dentition is to maintain the integrity and health of the dental organs and supporting tissues.(2) The response of the dental organ to infectious processes, such as caries, represents the complex interaction between defense lesions and regenerative processes.(3) The indications and objectives of pulp treatment are based on a clinical diagnosis that determines the state of the pulp.(4) Pulpotomy is one of the procedures to preserve the affected chamber pulp in deciduous dentition, which is estimated to have a success rate of 92%.(5)

Studies specifying the frequency of pulpotomy in different clinical settings are scarce. In South America, Colombia reports a pulpotomy treatment frequency of 77% in a university clinic;(6) Peru 26% in a center specialized in pediatric dentistry;(7) and Ecuador reports an 11% need for pulp therapy in children in urban parishes.(8) In Central American countries, Honduras reports a 15% need in a university clinic.(9) In Caribbean countries, Cuba reports a frequency of 12% in a dental school.(10) At the national level, a study carried out in a dental school in Yucatan reported that 8% of children attended required endodontic procedures in permanent teeth.(11)

Biological variables involved in pulpotomy treatment are described, being more frequent in males with a range of 51% to 58%;(6,10,11) and others report females with a range of 41%-67%.(7,8) Regarding the deciduous dental organs involved, the right lower first molar, (6,7,10) and the left lower first molar are reported as the most frequent to be submitted to the procedure.(9) In other studies that evaluated the permanent dentition, the right lower first molar is described as the most frequent to be submitted to endodontic treatment.(11)

To reduce pulpal pathologies in children, it is important to establish preventive dentistry programs aimed at parents in order to maintain optimal oral health in children.(8) The lack of knowledge of parents about these issues has repercussions on the oral health of their children.(11) In our region there are no studies that report on the frequency of pulpotomy treatment or that inquire about the factors associated with the event. Therefore, it is important to know the event in order to reinforce future strategies to reduce the affections of deciduous dental organs.

The objective of this research was to estimate the frequency of pulpotomies and identify associated factors among children in a comprehensive pediatric dentistry unit from Chilpancingo, central region of the state of Guerrero, Mexico.

Material and methods

Cross-sectional study that collected information from clinical records of a comprehensive pediatric dentistry unit of the private sector from Chilpancingo, central region of the state of Guerrero, Mexico. Due to the difficulty in obtaining data, a non-probabilistic convenience sample was chosen. We collected the records of children with or without a history of pulpal disease who attended dental consultations during the period from August 2020 to March 2021.

The sample obtained was 68 clinical records. Based on the exclusion criteria, two files were discarded due to loss of follow-up of the case and one was eliminated because it did not have the auxiliary support. 65 files were selected that met the eligibility criteria, were completely filled out, and had the auxiliary support for the pulpotomy procedure.

The clinical record was the measurement instrument, from which information obtained indirectly was collected. Sociodemographic data were obtained, such as gender, age and place of residence. From the non-pathological personal history section, data were obtained on the frequency of brushing, parental assistance during brushing, brushing time, use of fluoride toothpaste and frequency of consumption of snacks between meals per day. To establish the socioeconomic level, data on housing characteristics were taken.

The dependent variable was the diagnostic report of deciduous teeth with a report of pulpotomy. The case was taken as those children's files with the diagnostic support made by the operators on duty. The dental organ involved was recorded according to the nomenclature of the International Dental Federation (FDI).(12)

Other variables of interest that were dichotomized were socioeconomic level. Scores were established according to the material of the walls of the dwelling, the number of bedrooms and the type of flooring. For wall material, cement and brick, a score of three points; adobe, two points; and wood,

mud or clay, one point. For the number of bedrooms, not including recreation areas, four or more rooms, three points; three rooms, two points; and one or two rooms, one point.

As for the floor of the house, cement, tile, wood or ceramic, two points; and dirt floor, one point. To obtain the parameter, the score was summed according to the responses collected. The responses followed three ordinal categories, where scores of seven to eight points were considered high socioeconomic status; middle class, six points; and low class, three to five points. The variable of frequency of snack consumption between meals per day followed two nominal criteria, where frequency ≥ 3 was taken as the worst condition, and <3, better condition.

For data capture, the EpiData V.3.1 program was used.(13) For statistical analysis of the data, the CIETmap program was used. Univariate analysis was performed to obtain the simple frequencies of the variables.(14) Subsequently, a bivariate analysis of the factors potentially associated with the need for pulpotomy was performed, calculating for each association the odds ratio (OR) and the 95% confidence interval (CI 95%) with Miettinen's proposal;(15) using Pearson's X^2 test with a decision limit < 0.05.(16)

We proposed to perform an explanatory multivariate analysis with the simultaneous Mantel-Haenszel procedure,(17) including in the initial saturated model the factors significantly associated with pulpotomy in the bivariate analysis. However, we did not perform this analysis because only one factor was significantly associated in the bivariate analysis.

The present study did not present any bioethical conflict, since the information obtained was from data that had already been elaborated. However, permission was obtained from the person in charge of the pediatric dentistry unit, who allowed the collection of the information. The research data only took into account the primary records of the clinical files. The confidentiality and anonymity of the parents' and children's information was protected.

Results

The 65 clinical records collected belonged to children aged 3 to 7 years. Regarding gender, 57% (n=37) were female and the rest were male. Regarding the place of residence of the children, 68% (n=44) were from the urban area and the rest from nearby localities.

In terms of oral health, the 66% (n=42) of the children brushed their teeth three times a day. Regarding parental assistance, the 26% (n=17) reported that they assist their children during toothbrushing. Of

the toothbrushing time, the 68% (n=44) took one minute to brush. Regarding the use of fluoride toothpaste, the 83% (n=54) use it for toothbrushing. As for the consumption of snacks between meals, the 75% (n=49) reported consuming three or more snacks between meals per day.

Recalling that, for the study, housing data were taken into account, the 45% (n=29) were middle class, and 34% and 21% were low and high, respectively. Table 1 shows in detail the general information of the children based on the information in the clinical records.

The frequency of pulpotomy treatment was 37% (n=24). The proportion of females requiring the procedure was 67% (n=16/24) and 33% (n=8/24) in males. Five years of age was the most frequent age at the procedure with a proportion of 63% (n=15/24). Table 2 shows the distribution of pulpotomy by gender and age. Six dental organs involved in pulpotomy treatment with a history of caries were described. According to the FDI nomenclature, the lower right temporal first molar was the most frequently involved in the procedure with 46% (n=11/24), followed by the lower first molar and lower left second molar (Table 3).

The bivariate analysis identified one variable associated with pulpotomy. The factor identified was in a protective sense, the use of fluoride paste (OR=0.08; CI 95% =0.01 - 0.44). The association estimate and 95% confidence interval are shown in Table 4.

Discussion

The frequency of pulpotomy treatment was 37%; with a female to male ratio of 2:1. The lower right first deciduous molar was the most affected by caries with a proportion of 46%. The use of fluoride paste was identified as an associated factor in the sense of protection, where it is estimated that not using it has a risk of almost eight times of culminating in a pulpotomy procedure.

One of the limitations of the study was the cross-sectional design, which makes it difficult to establish the temporality criterion, especially in those variables that can be modified. Another point was to obtain data from clinical records, which restricts the collection of other data of interest, causing an underreporting bias. In addition, since the information was collected from past data, it is possible that some of the children's data may have been modified during the clinical follow-up of the pulpotomy, giving rise to a possible retrospective judgment bias. Also, the questions in the clinical records are

already designed to obtain concise information in a general way, preventing modifications to obtain other response categories.

We accept that a major disadvantage of the present study was the choice of convenience sampling, as this compromises the external validity of the study, making it impossible to extrapolate the results. However, this was due to the existing difficulty in accessing information from other clinical records. Nevertheless, the study provides valuable initial information in the region, especially when there were no fundamental reasons that differentiate the information in the files to which we had access from those that form the total population. Another drawback of our study is the sample size, since a larger sample would probably have achieved statistical significance in some of the associated variables; weight this was influenced by the low consultation derived from the coronavirus pandemic.

The frequency of pulpotomy that we report is within the reference range reported in other studies.(6,7,8,9,10) Noriega-Herrera *et al*., reported a high frequency of 77% in Colombian children,(6) and the study by Trigueiro-Camposi *et al*., described a low frequency of 12% in Cuban children;(10) with our findings resulting in a close average between these studies. The difference between our study and others is the reference site, since other authors mention children attended in university clinics;(6,9,10) and in urban parishes.(8) The study by Gamarra *et al*., is the only one that takes as reference a similar site to ours, although they describe a low frequency.(7)

Regarding biological variables such as gender, we found that females have the greatest predilection for pulpotomy, as do others.(7,8) As for the most common deciduous dental organ undergoing the procedure, it was the right lower first molar, similar to other authors;(6,7,10) and disagreeing with Pineda *et al*., who reported the lower left first deciduous molar in Honduran children.(9) Some studies document that the carious process is more frequent in the molars of the lower right hemiarch, due to their anatomy and the difficulty of visualization at the time of oral hygiene.(18,19) Therefore, it is important that parents assist their children during brushing up to the age of eight years, instructing them in the time and manner of maneuvering.(20)

With regard to the protective factor, the use of fluoride toothpaste, it has been demonstrated that this mineral element at certain concentrations protects the enamel layer as a preventive method against caries.(21,22) In our results, the history of using fluoride toothpaste prevents the imminent progression of dental caries. If this assumption is true, the use of toothpaste with this mineral element precedes the effect of reaching a pulpotomy procedure derived from the caries experience. It should

be noted that it is possible that there was a courtesy bias, since the question in the file is very general to the use of this element, and perhaps the parents answered positively thinking that it was the correct option to the question.

Given the results found in this study, it is necessary to create preventive strategies aimed at parents, who are responsible for the health of their children. Primary health prevention is essential to create awareness at an early age to help reduce the experience of caries in children. The deciduous dental organs are important for the permanent dentition, therefore, neglecting them will affect the development of the later dentition. One of the advantages of the study is that, through the compilation of information on clinical records, it helps to know what causes led to a pulpotomy, and that these data serve dentists to know the points to be reinforced in health education for children.

One of the characteristics of the comprehensive pediatric dentistry unit that served as a reference for obtaining data is that it is in the private sector and is situated in an urban area. Therefore, the data cannot be compared with public sector institutions or private centers situated in rural areas, since the population has different characteristics. Although the sample is not representative of the population, it provides valuable information that identifies initial trends for possible results that will nurture a line of research with future studies in the region.

The frequency of pulpotomy found in the study is within the range established in the literature. In view of the results found, primary health prevention is essential to create awareness at an early age to help reduce the experience of caries. It is also necessary to educate parents about the importance of taking care of their children's oral health.

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Table 1. General characteristics of the children

Variables	**Category**	**Frequency**	
		n=65	**%**
Sociodemographic			
Gender	Male	28	43%
	Female	37	57%
Age	3 years	4	7%
	4 years	11	17%
	5 years	25	38%
	6 years	17	26%
	7 years	8	12%
Housing area	Rural	21	32%
	Urban	44	68%
Oral health			
Toothbrushing frequency	3 times	42	65%
	2 times	17	26%
	1 time	6	9%
Parental assistance in toothbrushing	Yes	17	26%
	No	48	74%
Toothbrushing time	3 or more minutes	9	14%
	2 minutes	12	18%
	1 minute	44	68%
Fluoride toothpaste use	Yes	54	83%

	No	11	17%
Frequency of snacking between meals	≥ 3 times per day	49	75%
	< 3 per day	16	25%
Socioeconomic status			
Housing data	Low	22	34%
	Middle	29	45%
	High	14	21%

Source: Own calculations

Table 2. Pulpotomy performed among children, by gender and age.

Variable	**Category**	**Frequency n=24**	**%**
Gender			
	Male	8	33%
	Female	16	67%
Age			
	3 years	1	4%
	4 years	5	21%
	5 years	15	63%
	6 years	2	8%
	7 years	1	4%

Source: Own calculations

Table 3. Tooth organs involved for pulpotomy procedure among children.

Tooth organs*	Frequency n=24	%
84	11	46%
74	6	25%
75	3	13%
85	2	8%
55	1	4%
54	1	4%

Source: Own calculations

* The registration of dental organs was based on the nomenclature of the FDI World Dental Federation.

Table 4. Factors associated with the pulpotomy procedure among children.

Factor	Category	Pulpotomy n=24	No Pulpotomy n=41	OR [a]	CI 95% [b]
Gender	Male[ref]	8	20	0.52	0.18 – 1.49
	Female	16	21		
Age	3-4 years[ref]	6	9	1.18	0.36 – 3.87
	5-7 years	18	32		
Housing area	Rural[ref]	10	11	1.94	0.67 – 5.65

	Urban	14	30		
Tootbrushing frequency	≥ 3 per day[ref]	13	29	0.48	0.17 –1.39
	< 3 per day	11	12		
Parental assistance in toothbrushing	Yes[ref]	4	13	0.43	0.12 – 1.51
	No	20	28		
Toothbrushing time	≥ 3 minutes[ref]	3	6	0.83	0.18 – 3.68
	< 3 minutes	21	35		
Fluoride toothpaste use	Yes[ref]	15	39	0.08	0.01 – 0.44*
	Fluoride free	9	2		
Frequency of snacking between meals	≥ 3 per day[ref]	19	30	1.39	0.41 – 4.64
	< 3 per day	5	11		

Source: Own calculations

[a] OR= odds ratio

[b] CI 95% = confidencia interval of 95%