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Prevalence and Risk Factors of Caries of the First Permanent Molar: Study of Population Consulting at the University Hospital of Casablanca

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Abstract

Aim: The present study aimed to highlight the clinical status of the first permanent molar (FPM) in a group of child consultants at the Dental Emergency and Pedodontia departments - Prevention of CCTD Casablanca, and to determine the prevalence of FPM caries and its risk factors.

Materials and methods: This is an exploratory, descriptive cross-sectional study that covered all children aged 6 to 13 years. The age, sex of the child, the parents' Socio-Economic Level (NSE), their level of education, parents' knowledge of FPM, MIH (Incisive molar hypomineralization), their eating habits, as well as the type of pathology encountered were evaluated.

Results: A total of 216 children and 864 FPM were identified, 73.1% of the children examined had at least one decayed FPM, and 2.8% of decayed molars had Hypo-mineralization Incisive and Molar (MIH). The prevalence of mandibular molar caries (54.8%) was higher than maxillary molars (45.2%), with a dominant occlusal location (87.7%). More than 80% of parents surveyed confused the FPM with a temporary molar and did not know its eruption time. The consumption of sweets outside meals was observed in 96.8% of children examined and 78.7% of children brushed their teeth.

Conclusion: These data show the need for national oral health education and information activities and the development of an early detection program for FPM lesions with prophylactic therapies.

Keywords: Prevalence; FPM; Risk factors for caries; MIH; Child; Parental knowledge.

Introduction

The First Permanent Molar (FPM) named by Kunzel (1988), six-year molar is the first permanent tooth to erupt from the arch, it is the starting point for the organization of the permanent dentition. Due to its anatomy, its location in the arch, and the subsequent relationships, it contributes in children to maxillary and mandibular growth in the three dimensions of space, to the protection of the temporomandibular joints and to the stability occlusion [1]. FPM representing about 50% of masticatory efficiency, it is responsible for establishing the second physiological phase of occlusion; and plays a key role in angular occlusion [12,23,24].

Premature loss of this tooth can lead to midline deviation, development of diastemas, extrusion of antagonists, and unilateral mastication, resulting in malocclusion [9].

The FPM is confused by parents with temporary molars, due to its position on the arch and because it erupts without replacing any temporary teeth. Indeed, the low level of education and the socio-economic status of the parents, the early eruption of the FPM, its posterior location in the arch, its complex occlusal morphology, the immaturity of its constitutional tissues, the dietary habits harmful and oral hygiene still learned at this age, are the main factors behind the susceptibility of this tooth to decay [19].

This susceptibility to tooth decay is potentiated by the presence of a structural anomaly such as Molar Incisor Hypomineralization (MIH). MIH is associated with less resistant or almost non-existent enamel, which contributes to the exposure of the dentinal tubules. The teeth become oversensitive, difficult to brush, and care for [11].

In this particular context, the identification of caries risk factors and primary prevention play an important role in protecting the immature enamel of the FPM against acid attack and in accelerating its maturation.

Despite the importance of this tooth, only a few articles investigating the prevalence of FPM caries have been published. In Turkey [26], a survey of the condition of the 6 year molar of children aged 7-10 years reported that 15.9% of the children had FPMs with caries with an average DMFT index of 0.79±1.39. In Mali, the prevalence of caries in the first permanent molar was 66.17% according to a study carried out by [21]. In Morocco, a study carried out in 2009 in Rabat revealed a 65% prevalence of caries in the 6 year molar in children aged between 6 and 15 years [33].

Research on the clinical status of the first permanent molar and its condition remains very limited in Morocco, for this reason the present study was carried out in the pedodontic prevention department and in the dental emergency department at the CCTD, University Hospital Center Ibn Rochd of Casablanca. The main objective of this survey was to determine the prevalence of caries in FPM and its main risk factors.

Materials and methods

This is a descriptive exploratory cross-sectional study; it interested all child consultants of the Dental Emergency and Pedodontic Prevention departments of the CCTD of Casablanca were included in this study, children consulting for the first time, aged between 6 and 13 years, presenting a good general state of health, and having four Fpms on the arch.

Data collection was done through a survey form which had two parts. The first part, a quiz, addressed to parents to collect data concerning the age, sex of the child, the Socio-Economic Level (NSE) of the parents [7], their level of education, and their place of residence; the reason for consultation, the parents' knowledge of FPM, as well as the child's eating habits and oral hygiene. A second part reserved for the clinical examination through which data were collected concerning the condition of the 6 year molar, including the type of pathology encountered (caries, MIH, periodontal disease), and the complications of the FPM decay.

Results

Through this investigation, 216 children were identified, a total of 864 six-year molars examined. The average age observed was 9.5 years +/- 2 years.

55.1% of the population was male. 63.4% had a low NSE, the level of education was low in 54.6% of the parents questioned, and 94% of the patients came from an urban environment (Table 1).

More than 80% of the parents questioned confused the FPM with a temporary molar and unaware its time of eruption as well as its role in mastication (Table 2).

The consumption of sweets outside meals was observed in 96.8% of the children examined and 78.7% of the children brushed their teeth; with a frequency of less than twice a day for almost two-thirds of them (Table 3).

73.1% of the children examined had at least one decayed FPM and 2.8% of the decayed molars showed incisor and Molar Hypomineralization (MIH) (Table 4).

The carious location was found in 54.8% of the mandibular molars and 45.2% of the maxillary molars, with a dominant occlusal location (87.7%) (Table 5).

Progressive caries was observed in 92.2% of cases and among the 15% of FPM who presented a complication, 42.3% were pulp necrosis and 26.9% were pulpitis. 97.7% of the FPMs examined had care needs ranging from simple prophylactic therapy to extraction.

Table 1: Distribution of children by socio-demographic characteristics.

Variables	N	%
Sex		
Male	119	55,1
Female	97	44,9
Socioeconomic level		
Low	137	63,4
Medium	73	33,8
Affluent	6	2,8
parental education level		
Primary/ middle school	118	54,6
Secondary	44	20,4
University	27	12,5
Illiteracy	27	12,5
Residential		
Urban	203	94
Rural	13	6

Table 2: Parental knowledge about FPM.

Variables	N	%
The FPM is permanent		
Yes	41	19
No	175	81
Eruption time		
Don't know	181	83,8
7 year	16	7,4
6 year	15	6,9
5 year	4	1,9
Role in mastication		
Yes	24	11,1
No	192	88,8

Table 3: Oral hygiene and eating habits.

Variables	N	%
Sugar consumption		
Yes	209	96,8
No	7	3,2
Dental brushing		
Yes	170	78,7
No	46	21,3
Brushing frequency		
<Twice/day	124	73
≥Twice/day	46	27

Table 4: Status of the FPM.

Variables	N	%
Carious pathology of the FPM		
Present	158	73,1
Absent	58	26,9
No carious pathology of the FPM		
MIH	6	2,7
Without MIH	52	24,2

Table 5: Carious location on the FPM.

Variables	N	%
Maxillary and mandibular localization		
Mandibular	272	54,8
Maxillary	224	45,1
Localization on the dental surface		
Occlusal	435	87,7
Mesial	20	4
Palatal	16	3,2
Distal	13	2,6
Vestibular	10	2
Lingual	2	0,4

Discussion

Our study was conducted exclusively on the first permanent molar given its key role in maintaining the dental and general health of the child. The health of this tooth in particular can be a good basis for assessing a child's oral health. Our survey was conducted to determine the prevalence of caries in FPM and to identify its different risk factors.

The results of this study showed that 73.1% of the children examined had at least one decayed FPM. This high rate was consistent with several studies. A study conducted on 100 children aged between 6 and 15 years in Rabat showed that 77% of the children had FPMs with caries [33]. Another study conducted among 300 Sudanese children revealed that the prevalence of dental caries in FPMs was 61% [1]. In São Tomé [22], a survey on 1855 sixth-grade school children, mainly aged 11 to 14 years old, reported that 68.79% of the children had FPMs with caries.

In contrast, in some countries where programs to screen for dental caries, educate students in proper oral hygiene methods, and apply fluorinated varnish are introduced [26], a low prevalence of dental caries in FPM was found [32,2,5]. For example, in Saudi Arabia [2], a survey of 5,394 FPMs reported that only 16.5% of children had at least one decayed or filled FPM. In Turkey [26], a study on 11,457 children aged 7-10 years revealed that the rate of FPM caries was 15,9%. In China [32], a few reports showed a large variation in the prevalence of caries in FPM among children aged 6 to 8 years that reached in 2017: 29.0%.

All these data have shown a significant variation in the prevalence of dental caries worldwide; several factors such as socioeconomic level, eating habits, cultures, and ethnic origin may be responsible for this variation.

This susceptibility to tooth decay is related to the individual morphology of the tooth's pits and fissures, which can be prosperous shelters for microorganisms and make the oral hygiene procedures of these areas more difficult, allowing greater plaque accumulation [13].

The increase in the prevalence of dental caries is a result of dietary changes, including frequent consumption of high-energy, low-cost foods that are poor in nutrients and rich in sugar and fat and unbalanced consumption of sugar content [13]. Frequent sugar consumption can cause a long-term acidic oral environment and enamel demineralization, thus leading to caries. The consumption rate of sweet foods outside meals observed in our study was 96.8% of the children examined. These data were in agreement with those reported in the survey of Lin Que et al [22], that identified a positive association between consumption of desserts and candy/chocolate and dental caries in FPM.

The early and slow eruption of FPM can range from 5 to 32 months, in addition to the immaturity of the enamel and the presence of a particularly cariogenic bacterial flora make it vulnerable to acid attack. All these factors are compounded by inadequate oral hygiene of children and limited parental knowledge [19]. This explains the results, which showed that only 19% of parents knew that the six-year-old tooth was a permanent molar, and 83.8% did not know its eruption time, consistent with other studies in southern India [10] 11% of parents surveyed knew the time of the FPM eruption, and in Venezuela [19] only 12.09% of parents knew the age of eruption of the first molar and only 7.69% knew that it has no predecessor.

In this sense, a study conducted in Tehran [14] showed a significant association between DMFT and parents' knowledge of the time of eruption of FPM.

All of these findings have shown the essential role of parents in the prevention of oral diseases and the need for real education in oral health aimed at promoting the improvement of parents' knowledge of the FPM and its importance.

On the other hand, the prevalence of caries in the mandibular FPMs (54%) was higher than the prevalence of caries in the maxillary FPMs (46%) [22,1], Chouchene et al. 2021 [5,26].

The reason expected behind this common finding is the difference in the morphology and the earlier eruption time of the mandibular compared with maxillary FPMs [13]. In fact, mandibular FPMs have more pits and supplementary grooves, which can act as food- retentive areas. Some studies (Chouchen et al. 2021) have reported that in the majority of children, mandibular FPMs emerge slightly earlier than their maxillary counterparts, thus increasing the time of their exposure to the oral environment, making them more susceptible to caries [5,18].

Many surveys [22,1,13] have reported a preferred site of mainly occlusal caries of the FPM, consistent with our results where occlusal carious location is predominant (87.7%). The increased incidence of caries on the occlusal surfaces can be correlated to the morphology of these sites, which is more retentive to food particles, relatively protected from mechanical

cleaning by tongue, cheeks, and tooth brushing, and is not fully exposed to the flushing action of saliva [1].

Mesial caries is often related to the progressive caries of the distal surface of the second temporary molar [13,20,31,25]. According to our results, 68.8% of children with FPM caries have at least one caries at the level of temporary second molars.

We found only 14 cases (2.8%) of Molar Incisor Hypomineralization (MIH) with caries secondary to this structural anomaly. This was in agreement with a study carried out in Tunisia [5], which revealed that MIH was recorded in 4.3% of FPMs, with no significant association with caries activity in FPMs. Contrary to these data, several epidemiological studies conducted around the world have proven a positive correlation between the presence of MIH and the high prevalence of caries in FPMs [29,8,16]. This enamel structural anomaly alters the composition of the enamel, which is then fragile and splits under the effect of masticatory forces, exposing the underlying dentin to bacterial attack, and caries can develop very easily in those molars [8,16].

Conclusion

The results of this study indicate that the clinical status of the first permanent molar is alarming. Therefore, it is essential to establish national oral health education and information activities complemented by measures aimed at early detection of FPM lesions, prophylactic therapies, and application of fluorinated varnish. It is the combination of the efforts of all concerned (Ministry of Health, Moroccan Association of Oral and Dental Prevention, Ministry of National Education) that remains the only guarantee of the success of any action of this kind.

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