

Prevalence of Hypomineralization in Second Primary Molars (HSPM) in 7 to 10-Year-Old Saudi Children

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ABSTRACT

Background: The aim of the study is to know the prevalence of hypomineralizations in second primary molars (HSPM) in 7- to 10-year-old Saudi children.

Materials and Methods: A Total of 596 school children of age group 7-10 years was screened for HSPM. Clinical examination was done inside the respective schools. Dental examination was carried out by using scoring criteria to identify for HSPM on we surface under the portable light source. The results were recorded and analyzed for statistical significance using the Chi-square test and t-test with a P-value of <0.05 considered significant.

Results: In this study, 596 (80% males) of the 745 selected children participated. Causes for nonparticipation were not interested, lack of time, fearful child, language problems, not present, and other reasons. Distribution of HSPM according to the age of the children is shown in the In 32 (5.4%) children a second primary molar was seen with a demarcated opacity, an atypical restoration or posteruptive enamel loss, with a mean of 4.6 HSPMs per child. Among the 32 affected children, 9 had 1 HSPM, 11 had 2 HSPMs, 7 had 3 HSPMs, and 5 had 4 HSPMs.

Conclusions: Children with a higher prevalence of HSPM, also suggests that HSPM is a predisposing factor for MIH. Several other studies also suggested that HSPM lesions were associated with carious lesion occurrence and increased disease severity. Increased awareness of HSPM in children and primary health settings may help to identify children at risk early.

Key words: HSPM, Primary second molars, Enamel defect, Prevalence, Children, Saudi Arabia

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INTRODUCTION

Hypomineralized second primary molars (HSPM) describe demarcated qualitative defects of the enamel of systematic origin affecting ≥ 1

second primary molar [1]. The condition is a risk factor for molar-incisor hypomineralization (MIH), sharing a similar clinical presentation, structural properties, and putative. The prevalence of HSPM is between 4% and 14.5% [1-4]. In addition to serving as a useful indicator of MIH risk, HSPM contributes to caries risk among young children. Although the causes of MIH and HSPM are currently unknown, a combination of environmental factors from the

prenatal and early life period and genetic and epigenetic factors is thought to contribute [5]. Disturbances in the process of initial calcification and maturation of enamel causes HSPM in the affected teeth [6]. During prenatal and perinatal period, both permanent first molars and second primary molars have association between the mineralization of crowns which could also be affected by hypomineralization if some factor were to operate during this developmental stage. Hypomineralization has been observed in second primary molars and even in the cusps of permanent second molars and canines [7].

Hypomineralized Second Primary Molars (HSPM) is the term currently used for the condition previously known as Deciduous Molar Hypomineralisation (DMH). Both the condition has same idiopathic hypomineralization affecting one or more second primary molars. HSPM has characteristic features like Molar incisor hypomineralization (MIH): white, yellow and brown opaque stains, atypical restorations, posteruptive enamel and caries with sensitivity, tenderness and difficult treatment [1]. Opacities and atypical extractions are considered as mild and severe form of HSPM respectively [8].

HSPM are clinically similar features as MIH: white, yellow, or brown discoloration of the enamel [1]. These developmental defects cause children discomfort due to severe pain during shortly after the eruption of defective teeth, can cause concern to the parents and treating clinicians [9]. The defective enamel with increased porosity and disorganized rod structure will increase the risk for caries prone teeth. Hypomineralisation are also associated along with caries, dentine sensitivity and poor oral hygiene. HSPM are considered as risk factor for the early loss of second primary molars in children with having prevalence range from 4.6 % to 6.6 % [10]. Currently there are less information about the prevalence of HSPM in Saudi Arabian children. This study therefore aimed at determining the prevalence of hypomineralizations in second primary molars (HSPM) in 7 to 10-year Saudi children.

MATERIALS AND METHODS

A total number of 596 male school children were participated in the study with mean age of 8.5 years, and age ranges from 7- to 10-year-old were screened for HSPM in southern Saudi Arabia. Children who fulfilled the required inclusion criteria were examined by experienced clinicians. The examiners were trained and calibrated against each other prior to start of the study. Explanation about objective of the study

were given to the participants during examinations. Voluntary informed consent was obtained from the parents before the examination of child. Dental examinations were carried out by using a standard mouth mirror and dental probe. For the HSPM, the teeth were examined on wet and were recorded on a specially designed patient research datasheet. All the participating children were instructed to brush their teeth before the examination. After thorough brushing, the four primary second molars were examined on wet for demarcated opacities and atypical restorations under a portable light source.

Inclusive criteria

7- to 10-year-old children.

No systemic disease history.

Life-long residents in the selected regions (children born and living in the study area).

Well-demarcated opacities when examined under wet condition.

Children's mothers and fathers should have permanently lived in the respective area for at least five years before the child's birth, while breastfeeding was also practiced in the same region.

Four primary second molars were examined

Children with hypodontia, anodontia, and amelogenesis imperfecta were excluded from the study.

Hypomineralized second primary molars (HSPM) show a hypomineralization defect in 1-4 second primary molars, and the clinical appearance of the molars is like the appearance of molar incisor hypomineralization (MIH). All the surfaces of the primary second molars were examined for demarcated opacity on the occlusal and buccal part of the crown. The color of the opacity may vary from white, creamy, or yellow to brownish. Second primary molars of 7 to 10-year old were evaluated by visual examination for MIH-characteristic hypomineralization such as demarcated opacities, posteruptive enamel loss and atypical restorations, using criteria adapted from the EAPD criteria for diagnosing MIH in the permanent dentition, so teeth with fluorosis were excluded [11]. Three examiners were calibrated and well familiar with the diagnosis of HSPM, which would help to reduce the magnitude of error caused by study design. Ethical approval for performing the survey was obtained from the Scientific Research Committee (IRB/KKUCOD/ETH/2019-20/073) of College of Dentistry, King Khalid University. The results were recorded and analyzed for statistical significance using the Chi-square test and t-test with a P-value of <0.05 considered significant.

Table 1: Distribution of HSPM according to age of the children.

Age (Years)	Present		Absent		X2	P-value
	n-32	%	n-564	%		
7	12	38	188	33	3.26	0.32
8	11	34	128	23		
9	5	15	162	29		
10	4	13	86	15		

Table 2: Distribution of demarcated opacities, post eruptive enamel loss, atypical restorations and number of teeth diagnosed as HSPM in the total samples.

Tooth	Demarcated opacity		Post eruptive enamel loss		Atypical restoration		HSPM	
	n	%	n	%	n	%	n	%
55	16	2.7	9	1.5	10	1.7	31	5.2
65	13	2.2	12	2	9	1.5	26	4.4
75	19	3.2	8	1.4	8	1.4	24	4
85	17	2.8	13	2.2	11	1.8	29	4.9

RESULTS

In this study, 596 (80% males) of the 745 selected children participated. Causes for nonparticipation were not interested, lack of time, fearful child, language problems, not present and other reasons. Distribution of HSPM according to the age of the children is shown in Table 1. In 32 (5.4%) children, a second primary molar was seen with a demarcated opacity, an atypical restoration, or post eruptive enamel loss, with a mean of 4.6 HSPMs per child (Table 2). Among the 32 affected children, 9 had 1 HSPM, 11 had 2 HSPMs, 7 had 3 HSPMs, and 5 had 4 HSPMs. Statistically no differences seen. No differences were seen in the presence of HSPM characteristics between lower and upper jaws, or between the left and right sides. Opacities (76%) were most frequently scored in the HSPMs, followed by post eruptive enamel loss (52%). An interexaminer agreement, expressed as the test-retest correlation, was $r=0.96$.

DISCUSSION

Prevalence of HSPM varies between different countries ranging from 2.9% to 21.8 % [1-3, 10,12,13]. In the current study, prevalence of HSPM was 5.4 % reported at the child level and 4.8 % at the tooth level. All the second primary molars were affected in the child with HSPM. This was accordance to the other studies on permanent MIH molars [14]. The HSPM prevalence reported in our study was like results from Dutch [1] and Iraq [10]. Prevalence rate of more than 5% for any lesion is of epidemiological significance and considered as serious. A total of 596 children were included in the current study. The dental examinations were done with child in

a dental chair to assure the proper reproduction of the condition accordance with other studies. Recommended age for HSPM is 5 years [6, 11]. The mean age of the current research was 8.5 years, but the inaccuracy in recording HSPM may be due to severe caries, early exfoliation, since only small percentage of the primary second molars were not assessed (4%).

In the current study, only second primary molars were scored accordance to MIH criteria. Other studies also showed that second primary molars are most affected tooth by defective opacities [15, 16]. The second primary molars develop just before the permanent first molars and incisors start to develop. For HSPM, the same possible causes are mentioned as for MIH molars, though somewhat earlier in life (perinatal instead of postnatal) [15]. If a hypomineralized second primary molar was diagnosed, the most common defective lesion was opacities with less common observation was atypical restorations. In the primary dentition, molars are the teeth most often affected by caries, and second molars are more often affected than first molars. A positive correlation between enamel hypoplasia and caries in the primary dentition was found in some investigations [17].

Limitation of the study was the age at which the diagnosis of HSPM was determined. During this age, mineralization disturbances of primary molars are difficult to verify as restorations, severe caries and attrition often mask the effects of enamel developmental disturbances. Due to early loss of second primary molars with variety of reasons like post-eruptive breakdown resulting from long time exposure in the oral cavity and early extractions, it results in under-scoring of the prevalence of the lesion [17].

The clinical findings from the study suggests that it projects higher risks for MIH children who have

HSPM. Children with HSPM possess higher risk for caries and poor oral hygiene [18]. Early detection of HSPM will help to initiate preventive measures for the prevention of caries and poor oral hygiene. If these preventive measures are not employed, which will result in social, economic distress resulting from pain, psychological and multiple dental clinic visits [19]. Early detection of HSPM in children will provide preventive treatment for post-eruptive breakdown with beneficial public oral health measure for the study population.

CONCLUSION

The HSPM prevalence in the present study was 5.4% at the child level and 4.8% at the tooth level.

Upper right primary second molar was most affected individual teeth in this study as compared to other primary molars.

HSPM cases were found to be more in the maxillary arch as compared to the mandibular arch.

In conclusion, HSPM is a clinically and epidemiologically relevant problem in Saudi children. A correlation between greater HSPM defect extent and increased carious lesion severity existed. Diagnosing and treating HSPM at the early stages are crucial and should be part of the basic undergraduate education in Saudi universities. As the interest in HSPM is very recent, continuing education should also address this topic to bring it to the attention of all dental practitioners. The findings of the present study stress the need for educating present and future dentists and pediatric specialists in HSPM, as well as for developing public health policies for the prevention and adequate treatment.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

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