

Evaluation of health status of first permanent molar teeth among 12-year-old students in rural areas of south of Kerman, Iran, 2016

Parnian Poureslami¹, Shiva Pouradeli MSc², Hamidreza Poureslami DDS, MSc³, Emad Shahrokhi DDS⁴

Original Article

Abstract

BACKGROUND AND AIM: First permanent molar (FPM) has an important role in occlusion and biting. FPM is susceptible to dental caries due to early growth. The objective of this study was an evaluation of oral health status of FPM in terms of decayed/missing/filled teeth 6 (DMFT6) among 12-year-old children in rural areas of southern cities in Kerman, Iran.

METHODS: This analytical/cross-sectional study was performed in 2016 on 564, 12-year-old students (281 girls and 283 boys). Students were randomly selected from 32 different villages of southern cities of Kerman. The DMFT index was determined using the standard method suggested by World Health Organization (WHO). The trained dentist recorded data of DMFT index and oral health status in checklist form. Data were analyzed using SPSS software. $P < 0.05$ was considered as significant.

RESULTS: The frequency of FPM dental caries of students was 53.12-66.04%. There was no significant difference in mean of DMFT6 among students in rural areas of 7 cities in the south of Kerman, but it was greatest in Ghaleganj (2.60) and lowest in Jiroft (1.97), respectively. Girls had more carries than boys (DMFT6 2.43 vs. 2.13) but it was not significant ($P = 0.08$). There was a little amount of sealant or filled FPM (0.58%). 26.24% of students had a toothbrush. 19.14% of them brushed their teeth equal or more than once daily and 37.41% of them knew that the first molar is a permanent tooth.

CONCLUSION: Study showed a high rate of caries in FPMs in 12-year-old children and poor knowledge and performance in relation to these teeth. Therefore, it is absolutely necessary to provide health, educational and dental treatment services for villages in the south of Kerman province, Iran.

KEYWORDS: Students; Oral Health; Decayed/Missing/Filled Teeth Index; Molar; Permanent

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The first permanent molar (FPM) is undoubtedly the most important tooth in the oral cavity and has an important role in the development of a favorable occlusal relationship and the physical growth in children.¹ It has an important role in the mastication of food because it has a larger occlusal surface area than other teeth and its loss in the lower jaw

decreases the masticatory efficacy up to 50%.^{1,2} Since this tooth is one of the FPM to erupt into the oral cavity in children and its eruption does not need exfoliation of any deciduous tooth, the majority of parents are not aware of its presence in the children's oral cavity and make no attempts to preserve its health, believing that it is a deciduous tooth.³ On the other hand, the occlusal

1- Student of Dentistry, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran

2- Epidemiologist, Oral and Dental Diseases Research Center AND Kerman Social Determinants on Oral Health Research Center, Kerman University of Medical Sciences, Kerman, Iran

3- Professor, Oral and Dental Diseases Research Center AND Kerman Social Determinants on Oral Health Research Center AND Department of Pediatric Dentistry, School of Dentistry, Kerman University of Medical Sciences, Kerman, Iran

4- Dentist, School of Dentistry, Kerman University of Medical Sciences, Kerman, Iran

Correspondence to: Hamidreza Poureslami DDS, MSc

Email: hamid42pour@yahoo.com

surface anatomy of these teeth favors the adhesion of foodstuffs and their fermentation in that area due to the presence of various deep fissures, making this tooth susceptible to caries.⁴ Therefore, despite the importance of preservation of FPMs in a children's oral cavity, due to the reasons above, it is rapidly lost due to widespread caries and its complications. The literature has reported a high prevalence of caries in FPMs (80%) among children.³ Early loss of these teeth results in various complications, heavy costs of treatment, and needs for time and expert manpower.⁵

Jiroft, Kahnuj, Anbarabad, Rudbar, Ghaleganj, Menojan and Faryab are seven cities in the south of Kerman province in Iran, which are considered deprived areas in this province. The total surface area of these regions is approximately 49000 Km² (more than three times that of Kohgiluyeh and Boyer-Ahmad province in Iran and more than twice that of Slovenia and 70 times than Qatar), with a population of over one million people, and consisting of a large number of villages that harbor more than half of the population of these areas.

The villagers are engaged in agriculture and the population of some of the villages is more than 10000. These villages do not receive proper healthcare services and almost 60 dentists are working in these areas, with over half of them in Jiroft and the rest work in the six remaining cities. However, based on the World Health Organization (WHO) guidelines, one dentist should provide services to every 10000 individuals, which is far from the norm in these cities, i.e. currently 100 dentists should be working in the south of the province. However, the more worrying problem is the fact that this limited numbers of dentists are distributed unevenly and in some cities with a better social status there are more dentists and have only been concentrated centrally. They even are not present in big villages temporarily. It should be pointed out that in rural areas of these cities the provision of

oral healthcare is even worse (based on unpublished data provided by the Oral Health Office of Jiroft University of Medical Sciences). Considering the importance of FPMs in the oral cavity and since no study has evaluated this tooth in children in the deprived areas of 7 cities in the south of Kerman Province in Iran, the present study was undertaken to evaluate the status of this tooth in these areas.

Methods

In this analytical/cross-sectional study, the health status of FPMs of 12-year-old children was evaluated in rural areas of 7 cities in the south of Kerman province (Ethical Code: IR.KMU.REC.1395.336).

Based on the prevalence rate of caries in FPMs in other regions of the country and by considering similar studies in Babol, Iran, and Kerman, the sample size was calculated at 80 in each city, totally 560 subjects. First, the cities were considered as layers and within each layer, the list of the villages was taken from the Governor's Office of that city. Then, 4-6 villages were selected randomly for each city. Overall, 32 villages were selected. Then the schools of each village were visited and the 12-year-old children were examined during school hours.

Inclusion criterion was the 12-year-old students that present on the day of study and their parents signed an informed consent form. The study objectives were then explained to them.

The FPM in 12-year-old children was examined under the direct light of a 100-W bulb light with the use of a flat dental mirror and a dental explorer by a trained dentist. Data were recorded in the checklists. WHO guidelines and criteria were used for the diagnosis of caries.^{1,6} Then, some data related to the oral health status of these students were collected in another checklist.

At the end of the examination, the children were instructed in oral hygiene, and the importance of maintaining the health of the FPMs was explained to them.

Table 1. Distribution of health status of first permanent molars (FPM) based on rural areas of the cities

Rural areas	Healthy [n (%)]	Decayed [n (%)]	Filled or sealant [n (%)]	Extracted [n (%)]	Total [n (%)]
Rudbar	132 (40.24)	190 (57.92)	0 (0)	6 (1.82)	328 (14.53)
Ghaleganj	103 (31.79)	214 (66.04)	0 (0)	7 (2.16)	324 (14.36)
Menojan	128 (40.50)	183 (57.91)	2 (0.62)	3 (0.94)	316 (14.00)
Faryab	116 (36.25)	194 (60.62)	7 (8.75)	3 (3.75)	320 (14.18)
Anbarabad	133 (41.56)	179 (55.93)	2 (0.62)	6 (1.82)	320 (14.18)
Kahnuj	127 (38.71)	193 (58.84)	0 (0)	8 (2.43)	328 (14.53)
Jiroft	146 (45.62)	170 (53.12)	2 (0.62)	2 (0.62)	320 (14.18)
Total	885 (39.23)	1323 (58.64)	13 (0.58)	35 (1.55)	2256 (100)

Descriptive statistics were performed for assessing the mean, frequency and percentages. Student's independent t-test and ANOVA were recruited to compare 2 groups and more than 2 independent groups, respectively, using SPSS software (version 18, SPSS Inc., Chicago, IL, USA). $P < 0.05$ was considered as significant.

Results

In the present study, 564 subjects (283 boys, 281 girls), were examined in the rural areas of 7 cities in Kerman province. There was a mean of 40 subjects from each sex in each city. The highest frequency of caries in FPMs was reported in the rural area of Ghaleganj (214 teeth, 66.04%) and the lowest frequency was reported in the rural areas of Jiroft (170 teeth, 53.12%) (Table 1).

The highest mean of DMFT6 in boys was reported in the rural areas of Menojan (2.44) and the lowest was reported in the rural areas of Jiroft (1.7%). The highest and lowest mean values of DMFT6 in girls were in the rural areas of Ghaleganj (2.95%) and Anbarabad (2.00%), respectively. There was no significant difference between girls and boys in the mean of DMFT6 ($P = 0.08$). Also, there was no significant difference in mean of DMFT6 among 7 cities in the south of

Kerman ($P = 0.09$) (Table 2).

Table 2. The mean of decayed/missing/filled teeth 6 (DMFT6) index of first permanent molar (FPM) in the rural areas according to sex and city

City	DMFT6		
	Rural areas	Sex	
		Boy	Girl
Rudbar	2.34	2.08	2.60
Ghaleganj	2.60	2.26	2.95
Menojan	2.27	2.44	2.11
Faryab	2.41	2.04	2.79
Anbarabad	2.07	2.15	2.00
Kahnuj	2.30	2.25	2.36
Jiroft	1.97	1.70	2.25
P*	0.09	0.08	

*t-test, DMFT6: Decayed/missing/filled teeth 6

The children in the rural areas of Ghaleganj (14.62%) had the least and in Faryab (43.75%) had the highest number of toothbrushes. Also, the rural areas of Menojan (13.92%) and Ghaleganj (13.49%) exhibited the least frequency of tooth brushing. The highest level of knowledge in relation to the permanent nature of tooth 6 was reported in children in the rural areas of Anbarabad (43.75%) and Faryab (45.00%). 37.41% of them knew that this tooth is a permanent tooth. Only 30 children out of all the evaluated 564 children had 4 healthy and intact FPMs (Table 3).

Table 3. The frequency of some characteristics related to oral health status of students in rural areas of south cities in Kerman

Rural areas	Have toothbrush [n (%)]	Have daily tooth brushing [n (%)]	Caries free [n (%)]	Considering tooth 6 as a permanent one [n (%)]
Rudbar	20 (24.69)	16 (19.50)	6 (7.30)	28 (34.14)
Ghaleganj	12 (14.62)	11 (13.49)	2 (2.46)	26 (32.90)
Menojan	15 (18.98)	11 (13.92)	2 (2.53)	26 (31.87)
Faryab	35 (43.75)	26 (32.50)	5 (6.25)	36 (45.00)
Anbarabad	28 (35.00)	17 (21.25)	6 (7.50)	35 (43.75)
Kahnuj	19 (23.16)	12 (14.62)	5 (6.08)	29 (35.36)
Jiroft	19 (23.75)	15 (18.75)	4 (5.00)	31 (38.75)
Total	148 (26.24)	108 (19.14)	30 (5.31)	211 (37.41)

Discussion

The present study was undertaken to evaluate the health status of FPMs in a group of 12-year-old students in the south of Kerman province, 2016. Unfortunately, the prevalence of caries in the FPMs among 11-12-year old students is high in all countries. It seems 80% of children in these ages need restoration and/or extraction of this tooth. It is not done fissure sealant therapy for FPM, its pit and fissures decayed 7.5 times more than other teeth. There are antithetical results about the prevalence of caries in the FPMs according to the sex.^{5,6} In 2002, a descriptive study was undertaken in Kerman to evaluate the health status of FPMs in 12-year-old children.² The results of that study showed the caries was more frequent in girls compared to boys (19.9% vs. 16.0%). The results of the present study were consistent with those of the study in Kerman, indicating a generally higher prevalence rate of carious lesions in FPMs in girls compared to boys. A difference between boys and girls might be attributed to the earlier eruption of these teeth in girls compared to boys, a possible anatomic difference in these teeth, differences in dietary and oral hygiene habits and also possible quantitative and qualitative changes in saliva and changes in preferences with the earlier puberty in girls compared to boys.

Studies on the prevalence of caries in 12-year-old children in Mashhad⁶ and Neyshabour,⁷ Iran, have yielded similar results. Studies in Mashhad, and in other countries, including Poland⁸ and India⁹ have shown a higher rate of caries in lower first molars compared to upper first molars. In this study, we did not evaluate the difference in caries prevalence between upper and lower jaws.

In the present study, out of 2256 FPMs only 13 teeth had received fissure sealants, restorations (6 teeth had received fissure sealants and 7 had been restored). In the study of Kerman, none of the FPMs had received fissures sealants. However, in the present study, a small number of teeth had

received fissure sealants, indicating an increase in attention to teeth 6. However, it is far from the global goals of 2010 indicating that 50% of FPMs should undergo fissure sealant therapy.¹⁰

The present study showed that out of 2256 FPMs, 1323 teeth were carious (greater than 50%), which is far from the global aim that by 2010 the carious PFMs should have decreased to 11%. Also, DMFT6 of the subjects was 2.28, which is almost similar to that in 12-year-old children in Hamadan (2.17), Iran.¹¹ However, in Babol, this index was 1.59 in 12-year-old children.¹² Such a discrepancy might be attributed to better oral hygiene status in children in the urban areas in the north of the country due to improvements in the socioeconomic status. This index in 12-year-old children in Rafsanjan, Iran, was 1.9¹³ and again the difference might be explained by the possibly better socioeconomic status of students in urban areas of Rafsanjan compared to the children in the deprived rural areas in the south of Kerman province. In the study of Kerman, this index was 0.71, and the difference might be attributed to the following reasons: The subjects were selected from schools in the city center with better socioeconomic status. Moreover, it was carried out 15 years ago and it appears during these years the population's economic status has deteriorated in villages, along with an increase in the intake of carbohydrates, aggravating the oral hygiene status and increasing the caries rate.

Furthermore, in the Kerman study, out of 2400 FPMs evaluated, 16 teeth had been extracted and out of 240 evaluated teeth only 321 teeth were carious (13%), and 93 teeth had been restored. However, in this study, 35 teeth had been extracted out of 2256 evaluated teeth, which is an unfavorable finding in relation to the necessity of preserving the FPM. Greater than 50% of the teeth evaluated were carious, which can be attributed to the very poor oral health of the children in the rural areas in the south of Kerman province.

In a study in Karachi, Pakistan,¹⁴ out of 1808 FPMs evaluated in 8-12-year-old children, 1240 teeth were sound and 180 FPMs had been extracted or had not erupted yet and 568 teeth were carious, indicating a better health status of these teeth in Karachi. The differences might be attributed to cultural, nutritional, hygienic and age differences between two regions.

In the present study, comparison of DMFT6 between 7 cities revealed that the overall DMFT6 status of students in villages of Jiroft was the best and it was the worst in Ghaleganj; however, the difference between these two areas was not significant. DMFT6 in the other cities was somewhere between of these two areas. The reason for these minor differences is the unfavorable oral health status and socioeconomic poverty in the villages of the south of Kerman province.

The results of present study showed that out of 564 evaluated students, only 108 students, almost one-fifth, brushed their teeth at least once in 24 hours. There are many studies on caries prevalence of FPM but we did not find any study about FPM in young students, in which the caries status of these teeth and tooth brushing habits of the subjects have been evaluated at the same time. However, the results of present study are far from the recommendations of the health authorities all over the world that all the students should brush their teeth at least once in 24 hours.

In this study, only 148 had a toothbrush and of the rest 416 individuals, more than two-thirds, did not have a toothbrush, which is tantamount to disaster in relation to oral hygiene. In addition, the results of the present study showed that 211 students were aware that the FPM is a permanent tooth and the rest believed that the tooth was a deciduous tooth and will exfoliate later to be replaced by another tooth. In a study in Mashhad,¹⁵ the parents of the students in the first grade of elementary schools were evaluated. One-third of the parents were aware that the tooth 6 was a permanent tooth

that had erupted or was erupting in the oral cavity of their children. The study of Mashhad showed the necessity of increasing the awareness of students and their parents of the permanent nature of the tooth 6 and its eruption at 6 years of age.

In a study by Rasouli Tabar¹⁶ in Kermanshah, Iran, DMFT6 was 1.64, and 37.3% of 12-year-old children had no caries in their FPMs. Barati Nejad in Kashan, Iran,¹⁷ reported that DMFT6 was 2.09, with 18.2% of the subjects being caries-free. However, the results of the present study showed that only 5.31% of all the evaluated students were caries-free in all the four FPMs. A study by Ali et al. in Karachi, Pakistan, showed that 69.4% of the 8-12-year-old children had caries-free in FPMs.¹⁴ In a Massom et al. study in Hamadan, this value was 18.8% for 12-year-old children.¹¹ In a study by Sadeghi in Rafsanjan, 31.4% of 12-year-old children were caries-free.¹³ The differences, as discussed previously, might be attributed to differences in the amount of fluoride in drinking water, the nutritional habits, oral hygiene habits and also cultural, socioeconomic factors in different cities that directly and indirectly affect caries in FPMs.

The limitation of this study was the absence of some students on the day of assessing the DMFT6. Also, lack of measurement of other factors like level of parents' education that could effect on student's oral health was a drawback.

Conclusion

The results of the present study showed a high rate of caries in FPMs in 12-year-old children and poor knowledge and performance in relation to these teeth. Therefore, it is absolutely necessary to provide health, educational and dental treatment services for villages in the south of Kerman province, Iran.

Conflict of Interests

Authors have no conflict of interest.

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