

DMFT EVALUATION OF FIRST PERMANENT MOLARS AMONG 12 YEAR OLD CHILDREN IN THE REPUBLIC OF MACEDONIA

ЕВАЛУАЦИЈА НА КЕП ИНДЕКС НА ПРВ ТРАЕН МОЛАР КАЈ 12 ГОДИШНИ ДЕЦА ВО РЕПУБЛИКА МАКЕДОНИЈА

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Abstract

Introduction: The first permanent molar plays an important role in mastication and it preserves the vertical dimension of the jaws. Because of the particular anatomical form, the early eruption and the carelessness of the parents, it is usually prone to caries. The presence of caries on this tooth is often an indicator of the condition of other teeth. **Aim:** To evaluate the DMFT and its components of first permanent molars among 12 year old children in all regions of the Republic of Macedonia. **Material and method:** 19355 children at the age of 12 were examined by 147 calibrated dentists in dental offices. The data were entered in forms recommended by the WHO and statistically processed. **Results:** The DMFT was 1.59 (1.52 in males, 1.66 in females). The lowest DMFT value was recorded in the Northeast region - 0.92, and the highest in the Polog region - 2.96. The F component was the major contributor to DMFT Index (51.24%) followed by the D component (43.78%) and the M component (4.97%). **Conclusion:** Analysis has shown that consistent application of preventive measures is needed to reduce each of the DMFT components. **Key words:** DMFT index, first permanent molar, 12 year old children, preventive measures.

Апстракт

Вовед: Првиот траен молар има важна улога при мастикацијата и ја чува вертикалната димензија на вилиците. Заради специфичната анатомска форма, раната ерупција и невнимание на родителите, најчесто е подложен на кариес. Присуството на кариес на овој заб често е индикатор за состојбата на останатите заби. **Цел:** Да се направи евалуација на КЕП индексот кај 12 годишни деца во сите региони во Република Македонија. **Материјал и метод:** Беа прегледани 19355 деца на 12 годишна возраст од 147 калибрирани стоматолози во стоматолошки ординации. Податоците беа внесени во формулари препорачани од СЗО и статистички обработени. **Резултати:** КЕП вредноста изнесуваше 1.59 (момчиња-1.52, девојчиња-1.66). Најниска КЕП вредност беше забележана во Североисточен регион 0.92, а највисока во Полошки регион 2.96. П компонентата беше главен носител на КЕП индексот (51.24%) следена од компонента К (43.78%) и компонента Е (4.97%). **Заклучок:** Анализата на КЕП6 покажа дека е потребна доследна примена на превентивни мерки за намалување на секоја компонента на КЕП. **Клучни зборови:** КЕП индекс, прв траен молар, 12-годишни деца, превентивни мерки

Introduction

Good oral health is essential for the optimal general health and the overall quality of life. Furthermore, oral health incorporates the integrity and good condition of the specific parts of the oral cavity - teeth, oral mucosa, masticatory muscles, tongue, TMJ, and salivary glands - which participate in the performance of the vital functions such as chewing, speech and swallowing¹.

Having this in mind, an important aspect to be mentioned when talking about oral health is the dental caries.

In theory, it is a multifactorial disease that occurs for several reasons, such as irregular nutrition, the presence of pathogens, the morphology of teeth, inadequate oral hygiene, genetic predisposition and time². Furthermore, caries and periodontal disease are historically considered as the most important global burden of oral health. The research points out that dental caries is still a major health problem in most industrialized countries since it occurs in 60-90% of school children and the vast majority of adults. In 2004, WHO updated the epidemiological information available in the databases^{3,4}.

Additionally, the first permanent molar is the most important unit in the masticatory system and for the overall oral health. Early loss of this tooth can significantly affect the efficiency of mastication, decrease the vertical dimension, cause premature eruption of the second and third molar and dislocate the neighboring teeth⁵.

Due to its specific anatomical form, early eruption and ignorance about oral health by the side of the parents is very likely to cause initial caries to this tooth. The presence of caries of the first permanent molar is often an individual indicator of the oral health condition⁶.

Maintaining healthy lasting first molars is important because they erupt at an early age and are the first erupted teeth of the series of permanent dentition. Therefore, epidemiological studies with molars can be a powerful tool in planning an appropriate health system and health strategies⁷.

The age of 12 years is universally accepted as the most appropriate age for monitoring dental caries, since all permanent teeth, other than the third molars, are usually erupted³.

The World Health Organization (WHO) considers children of 12 years of age as one of the most important target groups, since in most countries children at this age attend a school that facilitates their mobilization in epidemiological research⁸.

The most important demographic indicator for evaluation and measurement of dental caries is the DMFT Index. This index shows the number of permanent teeth with cavities, the number of extracted teeth and the number of sealed teeth. The DMFT Index is used as an important criterion for assessing the status of oral health. But this index does not illustrate the true prevalence of teeth caries in a community. Therefore, the percentage of people without caries is used as a complementary index of the prevalence of caries in epidemiological studies⁹.

Aim

To evaluate the value and structure of the DMFT index in 12 year old children in Republic of Macedonia

Material and methods

The epidemiological study was conducted during September and October 2014 in all primary schools in eight regions in the Republic of Macedonia. All students from 6th grade, who were present at school on this day, were examined. The total number of children at the age of 12 (born in 2002), was 20.602. Precisely 19.355

(93.94%) were examined, of which 9.938 (51.34%) were boys, and 9.417 (48.65%) were girls. The dental examinations were performed by 147 dentists calibrated according to WHO standards for equalizing diagnostic criteria¹⁰.

The examinations were performed in a dental office with a probe and a mirror. However, X-ray methods to confirm the diagnosis were not used. The data were entered into unified translated and adapted forms recommended by the WHO, by dental assistants and then they were statistically processed.

Also, the data was categorized according to the WHO criteria for ranking the DMFT values for 12 year old individuals, including 0-none; 0-1.1 very low; 1.2-2.6 low; 2.7-4.4 medium; 4.5-6.5 tall; more than 6,6 very high caries rank¹¹.

Additionally, all components of the DMFT Index were analyzed, with emphasis on component K as an indicator for the necessary dental treatment of the examined category of participants.

The obtained data was also evaluated by sex and according to the region where the respondents come from, regardless of whether they come from an urban or rural area of the region and regardless of their socio-economic status.

Because the Ministry of Education is an official collaborator of the National Strategy for Prevention of Oral Diseases in Children 0-14 Year in the Republic of Macedonia, and the dental examinations are carried out every year according to the program frameworks and evaluation of the Strategy, no special permission was required for the implementation of this epidemiological study.

Results

The results of the epidemiological study showed that the DMFT index of the first permanent molar in 12 year old children in Republic of Macedonia is 1.59. Separately in the regions, the results are as follows: 0.79 in the Northeast region, 1.27 in the Pelagonia region, 1.50 in the Skopje region, 1.58 in the Southwest region, 1.70 in the Southeast region, 1.77 in the East region, 2.03 in the Vardar region and 2.12 in the Polog region (Table 1).

When taking the DMFT structure's aspect, the F (filled first permanent molars) was dominant in all regions except in the Polog and the Northeast region. Additionally, the results showed that in the Skopje region 56.14% of the first permanent molars were filled and 39.9% were decayed; 61% of the first permanent molars in the Pelagonia region were filled, and 33.94%

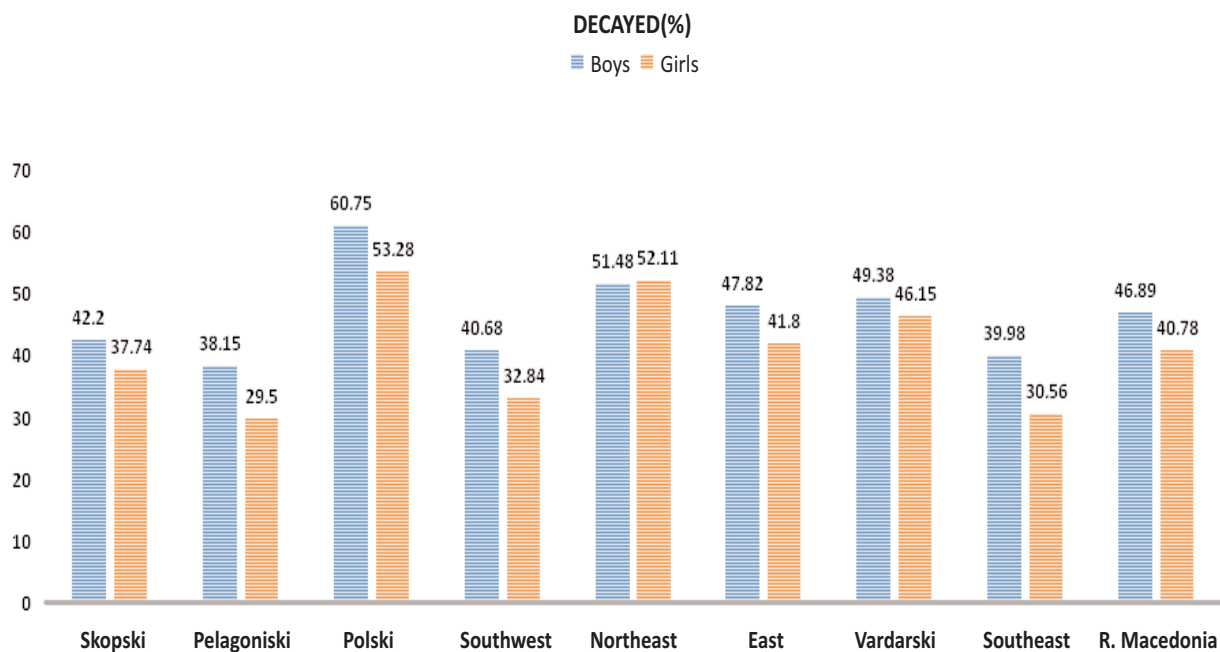


Figure 1. Decayed first permanent molar among children at the age of 12 across regions in RM

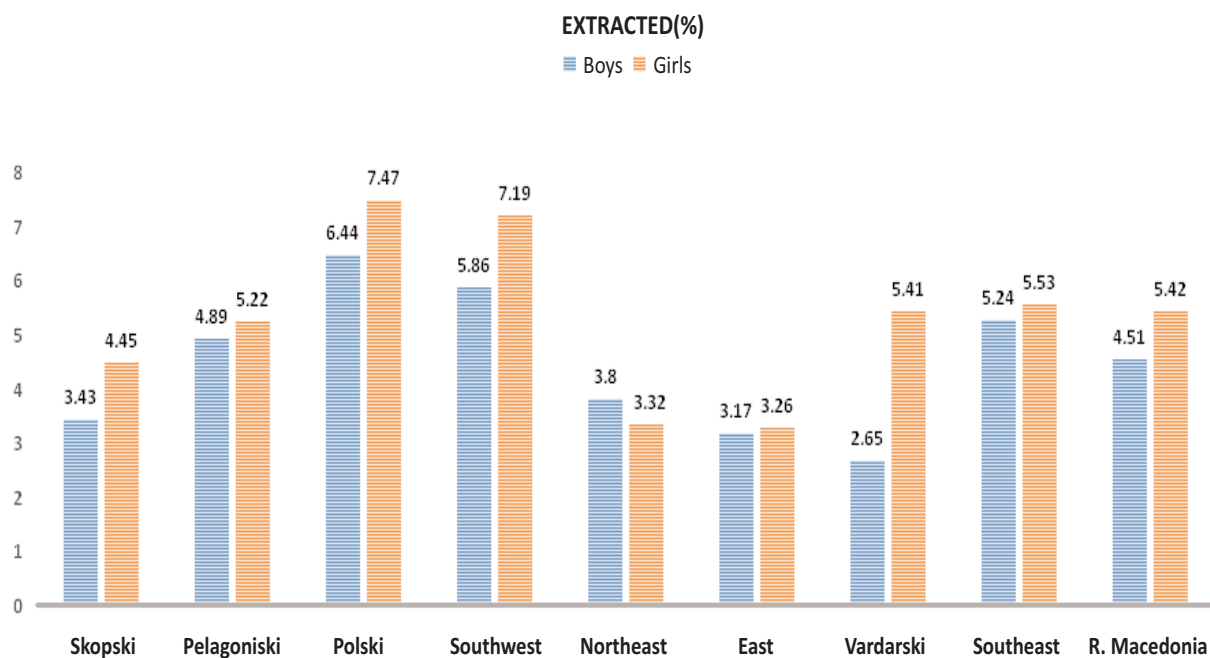


Figure 2. Extracted first permanent molar among children at the age of 12 across regions in RM

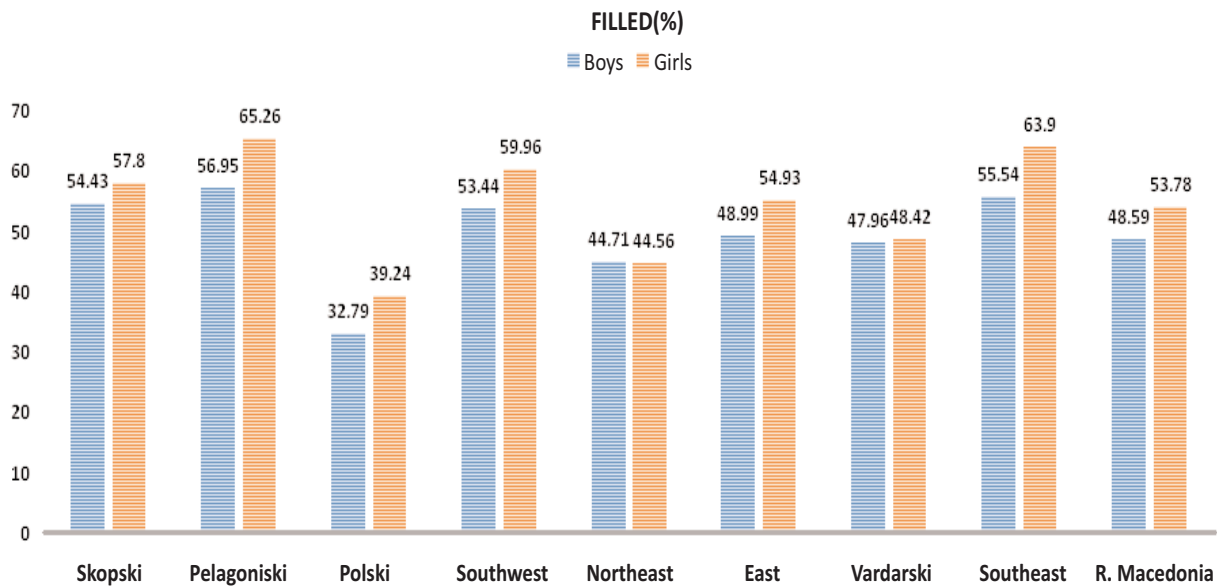


Figure 3. Filled first permanent molar among children at the age of 12 across regions in RM

Table 1. DMFT of first permanent molar among children at the age of 12 across regions in the Republic of Macedonia

Generation 2002 – first permanent molar Analyses 2014		REGIONS								
		Skopski	Pelagoniski	Poloski	Southwest	Northeast	East	Vardarski	Southeast	R.Macedonia
DMFT	Total	1.50	1.27	2.12	1.58	0.79	1.77	2.03	1.70	1.59
	Boys	1.43	1.25	2.04	1.47	0.81	1.61	1.98	1.61	1.52
	Girls	1.58	1.30	2.20	1.69	0.78	1.94	2.09	1.79	1.66

Table 2. DMFT components of first permanent molar among children at the age of 12 across regions in the Republic of Macedonia

Generation 2002 – first permanent molar Analyses 2014			REGIONS								
			Skopski	Pelagoniski	Poloski	Southwest	Northeast	East	Vardarski	Southeast	R.Macedonia
DECAYED	total	Number	3867	947	3723	1048	710	1219	1087	885	13486
		Percentage	39.9	33.94	56.98	36.57	51.78	44.65	47.75	34.76	43.78
EXTRACTED	total	Number	383	141	455	188	49	88	92	137	1533
		Percentage	3.95	5.05	6.96	6.56	3.57	3.22	4.04	5.38	4.97
FILLED	total	Number	5441	1702	2355	1629	612	1423	1097	1524	15783
		Percentage	56.14	61.0	36.04	56.85	44.63	52.12	48.19	59.85	51.24

were decayed; 56.85% of the first permanent molars in the Southwest region were filled, and 36.57% were decayed. 52.12% of the first permanent molars in the

East region were filled, and 44.65% were decayed; 48.19% of the first permanent molars in the Vardar region were filled, and 47.75% were decayed; 59.85% of

Table 3. MFT components of first permanent molar among children at the age of 12 across regions in the Republic of Macedonia in relation to gender

Generation 2002 – first permanent molar Analyses 2014			REGIONS								
			Skopski	Pelagoniski	Poloski	Southwest	Northeast	East	Vardarski	Southeast	R.Macedonia
DECAYED	Boys	Number	2012	546	1969	555	365	617	559	465	7088
		Percentage	42.12	38.15	60.75	40.68	51.48	47.82	49.38	39.98	46.89
	Girls	Number	1855	401	1754	493	345	602	528	420	6398
		Percentage	37.74	29.50	53.28	32.84	52.11	41.80	46.15	30.56	40.78
EXTRACTED	Boys	Number	164	70	209	80	27	41	30	61	682
		Percentage	3.43	4.89	6.44	5.86	3.80	3.17	2.65	5.24	4.51
	Girls	Number	219	71	246	108	22	47	62	76	851
		Percentage	4.45	5.22	7.47	7.19	3.32	3.26	5.41	5.53	5.42
FILLED	Boys	Number	2600	815	1063	729	317	632	543	646	7345
		Percentage	54.43	56.95	32.79	53.44	44.71	48.99	47.96	55.54	48.59
	Girls	Number	2841	887	1292	900	295	791	554	878	8438
		Percentage	57.80	65.26	39.24	59.96	44.56	54.93	48.42	63.90	53.78

the first permanent molars in the South-East region were filled, and 34.76% were decayed. From this, the overall results showed that at the level of the Republic of Macedonia 51.24% of the first permanent molars were filled, and 43.78% were decayed.

Alongside with this, the component M (missing first permanent molars) participated with the lowest percentage in the structure of the DMFT index. In the Republic of Macedonia 4.97% of the first permanent molars were extracted. Region wise, the results pointed out that 3.95% of the first permanent molars were extracted in the Skopje region, 5.05% in the Pelagonia region, 6.96% in the Polog region, 6.56% in the Southwest region, 3.57% in the Northeast region, 3.22% in the East region, 4.04% in the Vardar region and 5.38% in the South-East region (Table 2).

Taking the aspect of gender distribution into consideration, girls in the Republic of Macedonia have higher values of the DMFT index, 1.66, compared to the boys that accounted for 1.52. The F component is dominant in both sexes, but higher in girls compared to boys, except for the Northeast region where the value of the DMFT index as well as all DMFT components are approximately present in both girls and boys. The M component

is also with higher values among girls in all regions, but the D component is higher among boys in each region and in the country level of the Republic of Macedonia (Table 3).

Discussion

Many authors put emphasis on the aspect that teeth with deep fissure have a higher caries risk than teeth with smooth surfaces¹².

To start with, *Fleger and all.* predicate that in dental morbidity, first permanent molars play a big role and one third of this group of teeth is devitalized until the of age 18. Only 0.7% of adolescents have four healthy first permanent molars¹³.

Furthermore, the study of *MC Donald* shows a high frequency of cavities on the occlusal surfaces of the first permanent molars for all age groups and that the first permanent molar remains the most common location of caries for a very short period after its eruption¹⁴.

Serban and all, according to analyzes from their study, claim that the presence of the carious lesions of the first permanent molar reach their peak at about 12 years of age and this condition is in direct correlation

with the hygiene-dietary habits and with the health concept of the state¹⁵.

Additionally, *Wyne AH* believes that caries prevalence data are the basis for building health policies and preparing preventive programs and points out the need for treatment among the population¹⁶.

All of these claims as well as our personal experiences were a motive for the preparation of this study, even more when taking into consideration that, although caries is a widespread oral disease, and this is a well-documented condition among different population groups in many areas around the world, it is not the case in the Republic of Macedonia. In particular, the condition of the first permanent molar with the structure of all components of the DMFT index, especially among the 12 year old children participating in our study, has not been investigated and documented.

Also, our goal was to evaluate the condition of the same group of teeth that were sealed immediately after eruption (when participants were 6-year-old children and included in the national preventive program) because the same children at the age of 12 are no longer subject for intensive monitoring by the preventive teams.

According to the results of the study, the DMFT index of the first permanent molar in the 12 year old children in the Republic of Macedonia was 1.59, which is in the frame of the values that we found in our research. In the Republic of Macedonia, the value of the DMFT index for girls was 1.66 and for boys 1.52, which also coincided with the situation in other countries where this data has been researched.

Speaking of the other studies that have researched the same data, *Sadeghi* estimated that the DMFT value of the first permanent molar is 1.9 ± 1.6 (boys 1.83, girls 1.98)¹⁷;

A HaerianArdakani and all. estimate that the DMFT value of the first permanent molar is 1.17 ± 1.26 (boys 0.88, girls 1.33)⁶;

Parnian Poureslami and all. predicate that the DMFT value of the first permanent molar is 1.97-2.60 (boys 2.13, girls 2.43)¹⁸;

Massom T and all. concluded that the DMFT value of the first permanent molar is 2.17 ± 1.39 (boys 2.19, girls 2.22)¹⁹.

Wei Yin and all. estimated that the DMFT value of the first permanent molar is 0.61 (boys 0.47, girls 0.75)²⁰;

Gorgi Z. and all. claim that the DMFT value of the first permanent molar is 1.00 ± 1.36 (boys 0.93 ± 1.33 , girls 1.07 ± 1.39)²¹.

Regarding the structure of the DMFT components, research has shown that in the Republic of Macedonia the F component is the leader component in this index

with 56.14% as in many countries in Eastern and Central Europe, but this is not the case around the world where the D component is the dominant one^{22, 17, 23}.

Considering the fact that the oral health condition of the first permanent molar is the main carrier of the DMFT value, then the current condition of the first permanent molar among our participants clearly indicates improvement of the oral health of these children who were included in the National Preventive Program since their age of 6.

This fact is confirmed by *Alvarez-Arenal and all.* noting that the prevalence of caries in 12-year-olds was 71%, and the first permanent molar accounted for 64.1% of this percentage²⁴.

Conclusion

The results of this study show that oral health in 12-year-olds in the Republic of Macedonia needs to be improved by the consistent implementation of preventive measures at an earlier age since it reduces the value of the DMFT Index and all its components in permanent molar and the overall dentition in both sexes.

Reference

1. Markovic N. Muratbegovic AA. Oral Health in Bosnia and Herzegovina Schoolchildren – Findings of First National Survey. *Austin J Dent* 2014; 1(2):1010.
2. Togoo RA, Yaseen SM, Zakirulla M, Garni FA, Khoraj AL, Meer A. Prevalence of first permanent molar caries among 7-10 years old school going boys in Abha City, Saudi Arabia. *J Int Oral Health* 2011; 3:30-4.
3. Da Silveira Moreira R. Epidemiology of Dental Caries in the World. *Oral Health Care – Pediatric, Research, Epidemiology and Clinical Practices.* [Available from Aug 08.
4. Fazeli SA, Fazeli SA. First molar caries in primary school children of a northern city of Iran. *Pak Oral Dent J* 2005; 25:93-6.
5. Vejdani J., Simaei L.; The Associated factors of Permanent First Molar Caries in 7-9 Years Old Children; *Dentomaxillofac Radiol, Pathol and Surgery, Vol 3 No 1, Spring 2014.*
6. Haerian Ardakani A., Soleymani AA, Rashidi-Meibodi F, Gholami N., Hosseini-Abrishami M.; DMFT Evaluation of First Permanent Molars in Primary School Students in Yazd; *Journal: TOLOO-E-BEHIDASHT SUMMER 2012 Volume 11 Number 2(35), Page(s) 1 To 9.*
7. Barman M., Tirth A., Tandon V., Chandra V., Ain T S. Prevalence of Dental Caries in First Permanent Molars among 12 Years School Going Children in Purba Medinipur City, West Benegal. *Int Rese Journal of Clin.*2016; 1(1) Med. Vol 1 Issue 1, Jan 2016.
8. Mehrdad K. International epidemiology indexes at dental investigations proposed by the World Health Organization. 1st ed. Teheran: Shahid Beheshty University Jahad Daneshgahee; 1988. P.28-55.
9. World Health Organization. Oral health surveys: basic methods. 4th ed. Geneva: World Health Organization; 1997.
10. Castiglia *at all.*, Children's oral health in Italy: training and clinical calibration of examiners for the National Pathfinder about oral diseases. *Oral Health Prev. Dent*5. 255-261.

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11. World Health Organization (2002): Global Data of dental caries prevalence (DMFT) in children aged 12 years. *Global Oral Data Bank. Geneva: WHO.*
 12. Hicks MJ, Flaitz CM. Epidemiology of dental caries in the pediatric and adolescent population: a review of past and current trends. *J Clin Pediatr Dent.* 1993; 18:43–9.
 13. Dora Najžar-Fleger, Ljiljana Valentak; Epidemiološko ispitivanje stanja prvih trajnih kutnjaka u adolescenata; *Acta stomatologica Croatica, Vol.30 No.3 Rujan 1996.*
 14. McDonald SP, Sheiham A. The distribution of caries on different tooth surfaces at varying levels of caries - a compilation of data from 18 previous studies. *Community Dent Health.* 1992; 9(1):39-48.
 15. Veronica Serban, A. Maxim, Adriana Balan; Study of the caries in first permanent molar in children aged between 6-13 years; *Journal of Romanian Medical Dentistry; Volume 13 Issue 4 October/December 2009 pp. 138-141.*
 16. Wyne AH. Caries prevalence, severity, and pattern in preschool children. *J Contemp Dent Pract.* 2008; 9:24–31.
 17. Sadeghi Mostafa Prevalence and Bilateral Occurrence of First Permanent Molar Caries in 12-Year-Old Student *J Dent Res Dent Clin Dent Prospects.* 2007 Summer; 1(2); 86-92.
 18. Parnian Poureslami, Shiva Pouradeli, Hamidreza Poureslami, Emad Shahrokhi; Evaluation of health status of first permanent molar teeth among 12-year-old students in rural areas of south of Kerman, Iran, 2016;
 19. Massom T, Mojarrad F, Akhtari K. Evaluation of First Permanent Molars DMFT in 12 Years Old Children in Hamadan City (2005). *Avicenna J Clin Med.* 2007; 14 (2):64-68.
 20. Wei Yin et all. *International Journal of Oral Science* volume 9, pages10–15 (2017).
 21. Z Gorgi, A Abbasi, A Mohsenzadeh, A Damankeshan, M Sheikh Fathollahi; A survey on DMFT index of the first permanent molar in 12-year-old students of Larestan, Iran, in 2014; *JOHE* 2017, 6(1): 32-39.
 22. Petersen PE. Changing oral health profiles of children in Central and Eastern Europe: challenges for the 21st century. *IC Digest [Internet].* c2003 [cited 2015 August 15];(12):[about 3 screens].
 23. Ghandehari Motlagh M, Kohestani A., An investigation on DMFT an first permanent molars in 12-years old blind children in residential institutes for blinds in Teheran(200-2001) *Journal of Dentistry, Teheran University of Medical Sciences.* 2004; 1:56-61
 24. Alvarez-Arenal A, Alvarez-Riesgo J.A., Jose Miguel Pen A-Lopez J.M.P., -Vazquez J.P.F. DMFT, dmft and treatment requirements of schoolchildren in Asturias, Spain; *Com. Dent. Oral. Epidemial* 1998 ; 26(3): 166-169.