

Dental Caries Experience among 15 Year Old School Children from Macedonia and India

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Abstract

Aim: The aim of the present study was to compare the dental caries status of the 15 year old children of the southeast region of Macedonia and Bandipora District of Kashmir Division of Jammu and Kashmir State of India.

Materials and Methods: In this comparative study (N=565) 15-year old children from Macedonia and 1024 from India were included. Participant's dental status was evaluated using the 2013 World Health Organization caries diagnostic criteria for decayed, Missing or Filled Teeth (DMFT) by 2 calibrated examiners in Macedonia and by the single examiner in India.

Results: The mean value of the DMFT index for the whole sample of India was 1.72 ± 0.25 whereas for Macedonia it was 3.43 ± 3.01 , and the difference was statistically significant ($p < 0.001$). In the Indian sample, 132 (25.78%) and in Macedonia sample 106 (18.7 %) of the individuals were caries free (DMFT=0). In both countries, the female children have higher mean DMFT values. The filled component of DMFT was more among the Macedonian children which shows the higher utilization rates of dental care in that region in comparison to Indian counterparts.

Conclusion: The mean DMFT of children from Macedonia was higher in comparison with children from India. The most possible reason for this can be the fact that sugar consumption in India was less in comparison with Macedonia

Keywords: Macedonia; India; Caries; DMFT Index

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Introduction

Oral pathologies represent, because of their high incidence, one of the major health problems among children and adolescents. Oral diseases not only have an impact on general health and quality of life but may also increase the risk of mortality. There are widespread inequalities in oral health outcomes within and between different countries of the world [1, 2].

The World Health Organization (WHO) has proposed that until 2020, the impact of oral and craniofacial illnesses on an individual's health and psychosocial development should be decreased, emphasizing the significance of the promotion of oral health and decreasing illnesses of the oral cavity, which are affected by diseases or disease-promoting conditions [3].

It is observed that the American Region (AMRO) and the Europe Region (EURO) present a risk of 1.14 and 1.10 times higher than the average in the world. The African Region (AFRO) was with 19% lower risk compared to the average of all countries surveyed, followed by Southern Eastern Asian Region SEARO region [4]. Thus, primarily due to the increased use of fluorides from all sources, especially toothpastes, a decrease in dental caries among

children in highly developed countries started to emerge around 1970, and the percentage of caries free children in different age categories have increased since then. But changing trend has been seen in the developing countries like India and Thailand, which have reported an increase in dental caries. This could be ascribed to the increased availability and use of processed sugars and underutilization of preventive services in the developing countries [5, 6].

To assess the difference in rate of dental caries among children in the developing nations, we have considered children 15 years old from India and Macedonia, although both are in different continents and have differences in respect to demographic parameters. India being the second largest populated country in world, Macedonia takes the central part of the Balkan Peninsula in Europe. The whole territory of the Republic of Macedonia consists of just 8 non-administrative units-statistical regions and 84 municipalities as administrative units³ whereas India has 29 states and 7 union territories. But the currency rate of two countries are almost similar with Macedonian Denar is marginally higher than Indian Rupee.

For the current study, southeast region of Macedonia is taken and Bandipora District of Kashmir Division of Jammu and Kashmir State of India (Figure 1). The reason of for taking these two sites is that in Macedonia, there are couples of programs concerning oral health of children - National Caries Preventive Program and National Strategy of Prevention of Oral Diseases in children at age 0-14years [7]. In India there is no nationwide government funded preventive program regarding oral health but state of Jammu & Kashmir state runs a school health program which comprises dental health and is envisaged as an important tool to provide preventive, primitive and curative health services to the children. The Southeast Region (Figure 2) is located in the extreme southeast part of the country and comprises the Strumica-Radovish and Gevgelija-Valandovo basins, the Strumica River valley and the lower course of the Vardar River. In 2011, 8.4% of the total population in the Republic of Macedonia lived in this region. The region covers 10.9% of the total land area of the country and has a population density of 63.2 people per km² [8].

Figure 1: Location of Jammu and Kashmir in India



Figure 2: Southeast region of the Republic of Macedonia



The AIM of the present study was to compare the dental caries status of the 15 year old children of the southeast region of Macedonia and Bandipora District of Kashmir Division of Jammu and Kashmir State of India.

Material and Methods

The current study was conducted on samples from two countries - India and Macedonia. Ethical clearance was taken separately at both countries from the concerned authorities, for Macedonia it was Ministry of Health and for India it was Chief medical officer, Bandipora district, Jammu & Kashmir state. At both sites, samples were collected by cluster sampling because it was more economical and achievable within the constraints of resources and finance.

For Indian sample, the study was carried out in Bandipora District of Kashmir Division of Jammu and Kashmir State. Schools situated in the district and accessible were selected. Sample size of 1024 school going children was obtained with age of 15 years from the schools. The study was conducted over a time span of three months [June to August 2014] involving a total of 12 schools in Bandipora district. After obtaining consent from the school authorities, 25-30 children were examined per day and given free dental treatment. The children were examined by the single examiner.

The Macedonian sample constituted of 565 school children of 15 years from the cities and villages from southeast

Results

Total 565 and 1024 subjects were enrolled in the study for Macedonian and Indian sample respectively. The distribution of subjects gender wise and according to area of residence is shown in Table 1.

The mean value of the DMFT index for the whole sample of India was 1.72±0.25 whereas for Macedonia it was 3.43±3.01,

region of Macedonia, attending secondary municipality school “Nikola Karev” and Gymnasium “Jane Sandanski” in Strumica during April and May, 2013. Two calibrated dental examiners conducted the dental examination and the clinical part of the form was filled in by two other trained dentists (kappa values for inter-examiner reliability was 0.85).

The data recorded included socio-demographic variables and Clinical data related to dental caries for both samples was collected by means of Type III clinical examination in daylight using plain dental mirrors and probe, which took place in a separate room with the subject seated on the chair. At both sites, World Health Organization [2013] caries diagnostic criteria were followed [9]. The Decayed, Missed, or Filled Teeth (DMFT index) [10] was used to evaluate children’s dental caries experience.

Statistical Analysis

Simple descriptive statistical tests were used in the form of percentage and frequency distribution. T- test was used for the comparison of means. The SPSS software version 20.0 was used for performing the statistical analysis. The level of significance was set at $P < 0.05$.

and the difference was statistically significant ($p < 0.001$). In the Indian sample, 132 (25.78%) and in Macedonian sample 106 (18.7%) of the individuals were caries free (DMFT=0). (Table 2)

In Figure 3, the boxplot of DMFT score for both Indian and Macedonian is given, showing the range, quartiles and outliers.

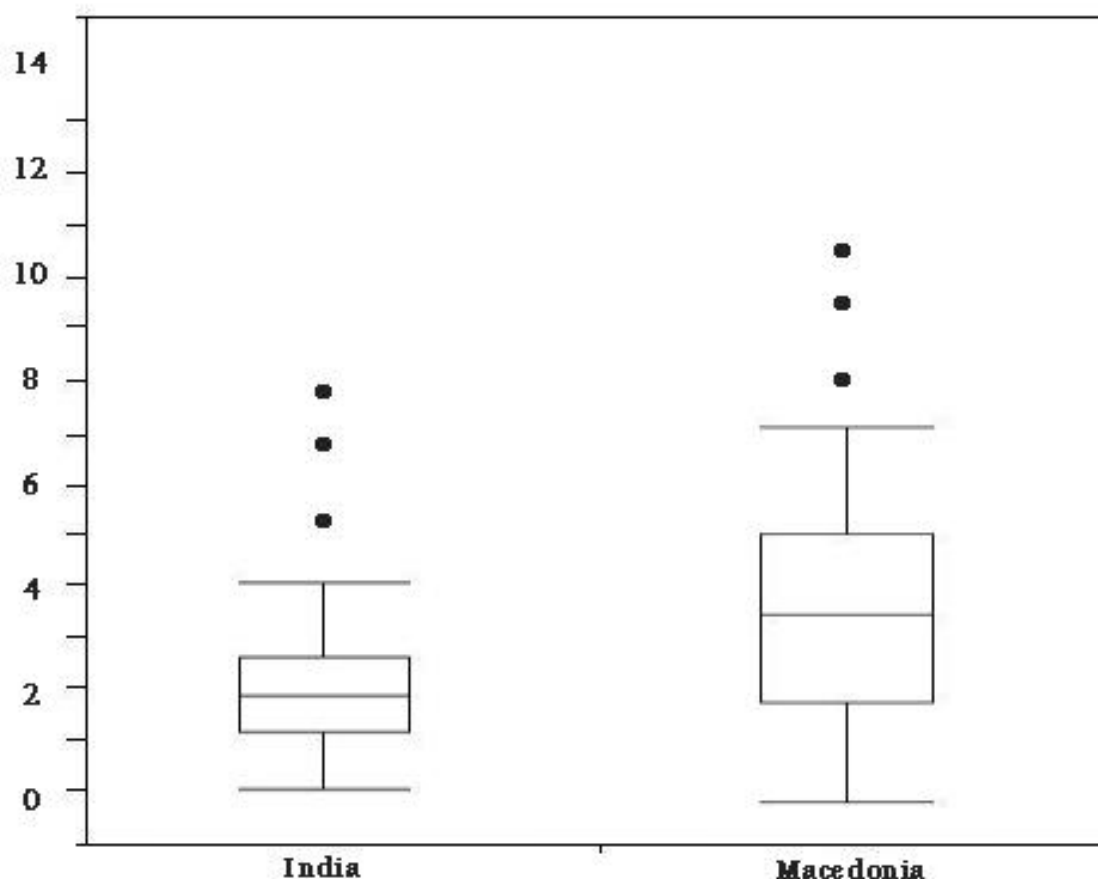
Table1: Distribution of individuals studied in sample

		Male	Female	Total
India	Urban	290	222	512
	Rural	310	202	512
	Total	582	442	1024
Macedonia	Urban	123	222	345
	Rural	82	138	220
	Total	205	360	565

Table 2: Caries free individuals, DMFT scores and equality tests for mean DMFT index.

	Caries free N (%)		DMFT Mean $\pm$ SD		p value
	India	Macedonia	India	Macedonia	
Whole population	132(25.78)	106 (18.7)	1.72 $\pm$ 0.25	3.43 $\pm$ 3.01	<0.001
Male	83(28.62)	78 (38.05)	1.85 $\pm$ 1.42	3.07 $\pm$ 2.94	<0.001
Female	49(22.07)	28 (7.78)	1.62 $\pm$ 1.40	3.99 $\pm$ 3.07	<0.001
Urban	62(24.22)	35(10.14)	1.90 $\pm$ 1.46	3.82 $\pm$ 3.38	<0.001
Rural	70(27.34)	71(32.28)	1.54 $\pm$ 1.34	3.20 $\pm$ 2.78	<0.001

Figure 3: Box plot of DMFT score in the study sample from India & Macedonia



The mean DMFT index with SD was calculated for each sample (according to gender and area of residence) and these results are reported in Table 2. On comparing the gender and location variables among two countries, corresponding p-values indicated that there were statistically significant differences between two countries.

The DMFT components, DT, MT and FT, were also analyzed. Their mean values with SD's for both samples are provided for in Table 3. The FT component is markedly higher in Macedonian sample (1.67 $\pm$ 2.42) than Indian sample (0.02 $\pm$ 0.09).

Table 3: DT, MT, FT Mean (SD) scores for the whole sample

	India	Macedonia	p value
DT	1.67±2.22	1.47±2.18	0.041
MT	0.045±0.34	0.30±0.75	0.294
FT	0.02±0.09	1.67±2.42	<0.001

Discussion

Dental caries is an international health problem among different populations, especially in adolescents. In Europe, during the last 30 years, caries has rapidly decreased in all age groups, especially in children [11]. The studies of Marthaler, conducted in the period of 1990-1995, showed that in all European countries, the frequency of caries had a tendency to decrease in children and adolescents. A high frequency of caries among children has been observed in some Central and Eastern Europe countries [12].

A total of 1589 children aged 15 years belonging to sexes, males (787) and female (802) were examined for dental caries and compared with region Socio-economic status and sex. The two regions selected were from India and Macedonia. The present study provides information in regards to 15 year old school children from Jammu and Kashmir state India and southeast region of the Republic of Macedonia.

The caries free population in India was 25.78 % which was higher than the population without caries in Macedonia with females showing less caries in the Indian population as compared to the Macedonian 15 year old children. The difference in the caries free population in the two populations did not reach statistical significance though a difference of 15% was observed as highest difference in the female population of the two places.

Many previous studies done in India are suggestive of the fact that sugar consumption in India was less than many other developing countries as Nigeria [13], Burkina Faso, Africa [14].

Macedonia being a developing country in similar region but has a higher consumption of sugars as compared to India which can be accounted for the increased level of caries in this country as compared to the India. While previous studies have reported a higher mean DMFT of about 3-4.98 in the Vardar

region from the Republic of Macedonia [15]. In the preliminary investigation of the dental caries experience of 15 year old children from the Southeast region we find lower mean DMFT of about 2.84 [16]. The caries prevalence of 15-year old children in our study is 81.3% for Macedonia and 74.22 % for Indian adolescent population.

As we mentioned in our previous publication [17], this prevalence of 81.3% observed in 15-year-old adolescents from southeast region of the Republic of Macedonia, were lower than those reported in the other studies from Balkan countries-for example, the findings reported by Markovic et al. [18]. In the study from Lalić M et al. [19] conducted in Belgrade, the capital of Serbia, DMFT index of 15-year old children was 5.84. These results from India show similarity to caries prevalence in Sardinian- Italian children (61.6%)[20], Romania school children [21], Slovenian children up to 12-years (61.6%)[22], 8-10 year old children of Tamil Nadu, South India (66.4%) [23], and 7 - 10 year old children of southwest Germany (58.4%) [24].

On the contrary many previous studies have reported a much higher caries prevalence in similar age groups as Sudha P. et al. (2005) reported 82.5% in 5- 13 year old school children from Mangalore [25], Yee and Sheiham (2002) reported 81% in low-income nations [26].

The recorded DMFT for Indian population was 1.72 ± 0.25 which was lesser than the Macedonian counterparts who had a mean DMFT of 3.43 ± 3.01 . While the DMFT for similar age group in Jammu and Kashmir state recorded in 2002-2003 was 1.1 which is much lesser than in the current population under study [27].

Similar results have been reported by Cesar MA. and P.E. Peterson (2003) in Portugal [28], Batwala V et al. (2007) in Mbarara, Uganda [29], Zerfowski et al. (1997) in Southwest Germany [24], Bruce I. in a peri-urban community of Accra, Ghana [30] and Robert Yee et al. (2002) in 7-11 years in third world countries [26]. In contrast to these findings higher mean DMFT has also been reported previously in Japan children [31], in Swat Pakistan [32], in Chitambaram Taluk, Tamil Nadu [33], and in rural Punjab [34].

The difference in the number of Filled teeth 'F' component in the present population can be suggestive of the fact that these children of both countries don't have access to the dental services. While comparing the rural and urban population of both the places highest caries free population was seen in the rural population of Macedonia. This may be attributed to the changing pattern of lifestyle, the diet habit and the ignorance shown by the people regarding visits to the dentist [35, 36].

Although epidemiological data on caries of children in developing countries is scarce, knowledge of the life history and patterns of caries can be utilised to give a more detailed epidemiological picture. In the Republic of Macedonia, a system for monitoring and registration of dental caries exists, but the statistics is not coordinated with that of the European Union and the WHO and the existing legal obligations are not respected. For that reason, database with relevant statistical indicators (DMFT) do not exist [37]. In the future we have to build up epidemiological registers at national level, the same as there exist in Sweden [38] and other developed countries. It shall be made clear to the authorities that the caries prevalence in the two regions is of concern. The higher DMFT than WHO goal shall be reduces in order to reduce the burden of disease on both the countries.

Conclusion

The mean DMFT of children from Macedonia was higher in comparison with children from India. The most possible reason for this can be the fact that sugar consumption in India is less in comparison with Macedonia. One obvious aspect of a positive strategy would be a move from the current way in which oral health services are directed to children in Macedonia, towards preventive and promotional activities under the umbrella of Minimal Intervention Dentistry. The present study concludes that in 15 year olds are having better treatment rates in Macedonia

when compared to India, and the rate of tooth decay is lower which suggest that there is a need of more extensive preventive measures and change in diet pattern is needed for Indian children.

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