Children's oral health of Roma, Ashkali and Egyptian Community

Valmira Maxhuni Bajgora[1], Agim Begzati[1], Lindita Maxhuni[2]*

1. Department of Pediatric Dentistry, School of Dentistry, Medical Faculty, University of Prishtina, Prishtina, Kosovo.
2. Department of Human Ecology National Institute of Public Health, School of Medicine, Medical Faculty, University of Prishtina, Prishtina, Kosovo.

Abstract

This study aimed to assess the oral health of Roma, Ashkali, and Egyptian (RAE) children in the Republic of Kosovo by assessing their decayed, missing, and filled teeth (DMFT) index and oral hygiene index (OHI) as well as salivary Streptococcus mutans levels.

We included 202 RAE children aged 4–15 years. The DMFT and dmft indices were evaluated for permanent and deciduous teeth, respectively, in these children; furthermore, OHI (according to Greene and Vermillion) was assessed. Moreover, the presence of S. mutans was evaluated using the CRT® bacteria caries risk test (Ivoclar Vivadent, Liechtenstein) in 131 of the 202 children.

The overall mean dmft index was 3.86 ± 3.38. The mean dmft index was higher in males than in females, without a significant difference (4.04 ± 3.38 vs 3.69 ± 3.38; Z = 0.70; P > 0.05 [P = 0.48]). The overall mean DMFT index was 2.07 ± 2.06. The mean DMFT index was higher in females than in males, without a significant difference (2.18 ± 2.25 vs 1.95 ± 1.83; Z = −0.38; P > 0.05 [P = 0.70]). The mean OHI (Greene and Vermillion) was 2.27 ± 0.74; the mean value of the plaque component of OHI was significantly higher in males than in females (2.38 ± 0.72 vs 2.18 ± 0.74; Z = 2.67; P < 0.01 [P = 0.008]). Furthermore, a significant difference was found in the number of S. mutans colonies in 1 mL saliva according to the sex of the children (Pearson χ2 = 8.24; P < 0.05 [P = 0.02]).

The OHI index was high in all children, and S. mutans was present in the saliva of all children evaluated for it; this indicates poor oral hygiene status and high caries risk in RAE children.

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Introduction

In Kosovo, Roma, Ashkali, and Egyptians (RAEs) follow traditional ways of life and make substantial contributions to the diverse society of this territory with their distinct traditions and culture. RAEs account for 0.51%, 0.89%, and 0.66%, respectively, of the total population of Kosovo. Some of them often live in informal settlements with poor infrastructure and in houses that are in poor condition.[1] Difficult economic conditions also affect the health of RAE community members, who already have low health levels.[2]

It is known that throughout Europe, RAEs have been subjected to discrimination for centuries. They continue to face discrimination and racial prejudice and are among the most oppressed communities in Europe. All social and economic indicators clearly testify to this fact, with Kosovo being no exception. Unfortunately, RAEs can be considered as being discriminated against as they are the poorest and probably the most disadvantaged community in Kosovo and are among the communities with the least prospect for a better life.[2]

We have centered our research mainly on the oral health of RAE children in Kosovo, focusing mainly on dental caries and gingival diseases.

Dental caries is a multifactorial disease that occurs as a result of increased microbial virulence and proliferation of microbial structures in dental plaque. The occurrence of dental caries is influenced by 4 factors: bacterial load, tooth, diet, and time.[3] It is also influenced by other factors such as lifestyle, diet, and poor oral

Corresponding author:
Lindita Maxhuni,
Department of Human Ecology National Institute of Public Health, School of Medicine, Medical Faculty, University of Prishtina, Prishtina, Kosovo.
E-mail: lindita.maxhuni@uni-pr.edu

health care.[4] Dental caries is characterized by the destruction of the strong tooth substance caused by bacteria.[4] It is the main oral health problem in most industrialized countries, affecting 60%–90% of school children and most adults.[5] Dental caries has a major impact on the absorptive health of a population.[6]

Despite a decline in its worldwide prevalence, dental caries remains one of the most common chronic diseases of childhood.[7] The prevalence of caries in some areas in India has been reported to be quite high; it is 54.6% in Ghaziabad,[8] 73.17% in Bhopal City,[9] 69.12% in Vadodara,[10] and 80.92% in Maharashtra.[11] However, there is variation in this prevalence across different countries: 44.66% in Kuala Lumpur, Selangor, Malaysia;[12] 36.3% in Ethiopia;[13] 73% in Eastern Saudi Arabia;[14] 74% in Egypt;[15] 78.64% in China;[16] and 79.7% in Iran.[17]

Presence of *Streptococcus mutans* in saliva has been proven to be the main risk factor for the dental caries occurrence,[18] and there is a correlation between the number of carious teeth and salivary *S. mutans* levels.[19]

Determining the dental health status and general health status in children is considered a priority for preventing dental caries because it will significantly affect their future quality of life.[20] Children with a good oral hygiene index (OHI) have a small number of carious teeth.[21]

We used OHI according to Greene and Vermillion to assess the oral hygiene status; furthermore, we used the decayed, missing, and filled teeth (DMFT) index for permanent teeth and dmft index for deciduous teeth to determine the prevalence of dental caries. The presence of salivary *S. mutans* was determined using a caries risk test. The abovementioned indices are the main indices used for determining factors related to oral health status.

Oral health assessment of RAE children and identification of factors adversely affecting oral health in these children can contribute to improvement in their oral health; furthermore, our results will guide the competent authorities to take preventive measures.

Materials and methods

Ethical approval for this study was obtained from the ethics committee of the medical faculty of the University of Prishtina, Kosovo.

Subjects

We included 202 RAE children aged 4–15 years in this study. The DMFT index for permanent teeth and dmft index for deciduous teeth were evaluated in these children; furthermore, OHI according to Greene and Vermillion was determined. In addition, 131 of the 202 children were evaluated for the presence of salivary *S. mutans* using the CRT® bacteria caries risk test (Ivoclar Vivadent, Liechtenstein). Children who were uncooperative, had infectious diseases, and were handicapped were excluded from this study.

Clinical oral health assessment methodology

This study was conducted at family medicine centers, primary schools, and RAE community organizations; assessments were performed using a straight dental mirror and dental probe. The DMFT and dmft indices were evaluated according to the World Health Organization guidelines.[22]

The OHI according to Greene and Vermillion[23] helps determine the presence of dental plaque; it has a value of 0–3. The evaluation is performed using an exploratory probe. The index includes only 6 representative teeth:

-vestibular surfaces of the maxillary right and left first molars

-vestibular surfaces of the permanent maxillary right central incisor and permanent mandibular left central incisor

-lingual surfaces of the mandibular first molars

0. no soft plaque.
1. 1/3 of the teeth surface covered with soft plaque.
2. 1/3 to 2/3 of the tooth surface covered with soft plaque.
3. more than 2/3 of the tooth surface covered with soft plaque.

Simplified OHI (OHI-S) may range from 0 to 3 and is evaluated as follows: 0 = no debris or pigment, 1 = soft residue covering no more than one-third of the exposed tooth surface, 2 = soft residue covering more than one-third but not more than two-thirds of the exposed tooth surface, and 3 = soft residue covering more than two-thirds of the exposed tooth surface. OHI-S values of 0 and 1 indicate low oral hygiene, whereas values of 2 and 3 indicate good oral

hygiene.

Saliva sample

Stimulated saliva was collected in the morning from 131 randomly selected children. Each participant was given a paraffin tablet and asked to chew it and then expectorate stimulated saliva into the glass. The collected stimulated saliva was spread on to the agar surface on the test vial. The test vial was then placed in an incubator at 37°C for 48 h. After the vial was removed from the incubator, the density of *S. mutans* colonies was compared with those in the corresponding evaluation pictures in the enclosed model chart. Bacterial counts were recorded as colony-forming units per milliliter (**CFU/mL**) of saliva. The number of bacterial colonies was graded as follows according to the grading card provided by the manufacturer: class 0 (none detected), class 1 (CFU < $10^{3–5}$/mL), class 2 (CFU ≥ 10^5/mL), and class 3 (CFU > 10^5/mL).

Classes 0 and 1 indicated a low caries risk, whereas classes 2 and 3 indicated a high caries risk.

Statistical analysis

Data were analyzed using SPSS version 21.0.

Descriptive statistics (mean ± standard deviation [SD], 95% confidence intervals, Int.; Median; minimum and maximum) were used for expressing dmft and DMFT. To determine risk factors for caries associated with *S. mutans*, Fisher's exact test = 94.83; $P < 0.001$(p = 0.000)/Monte Carlo Sig. (2-sided) and Pearson χ^2 test were used. Significance level was set at $P < 0.05$. Data are presented in tables and graphically.

Results

Table 1 shows descriptive statistics for the dmft index components. The overall mean dmft index was 3.86 ± 3.38. The mean numbers of decayed (d), missing (m), and filled (f) deciduous teeth were 3.67 ± 3.32, 0.10 ± 0.42, and 0.08 ± 0.53, respectively.

Variable	Valid N	Mean	Confidence -95,00%	Confidence +95,00%	Median	Minimum	Maximum	Std.Dev.
d	201	3,67	3,21	4,13	4,00	0,00	14,00	3,32
m	201	0,10	0,04	0,16	0,00	0,00	3,00	0,42
f	201	0,08	0,01	0,16	0,00	0,00	6,00	0,53
dmft	201	3,86	3,39	4,33	4,00	0,00	14,00	3,38

Table 1. The dmft index.

Table 1.1 shows the dmft index values (mean ± SD) according to the sex. The mean dmft indices were 4.04 ± 3.38 in males and 3.69 ± 3.38 in females.

Gender	dmft Means	dmft N	dmft Std.Dev.
Male	4,04	93	3,38
Female	3,69	108	3,38
All Grps	3,86	201	3,38

Table 1. 1. Sex and dmft index.

The mean dmft index in males was higher than that in females, but the difference was not significant (Z = 0.70; $P > 0.05$ [$P = 0.48$]). (Table 2.1)

Variable	Rank Sum Male	Rank Sum Female	U	Z	p-level	Valid N Male	Valid N Female
dmft	9682,50	10618,50	4732,50	0,70	0,48	93	108

Table 1. 2. Difference in dmft index according to the sex of the children.

Table 2 shows the descriptive statistics for the DMFT index components. The overall mean DMFT index was 2.07 ± 2.06. The mean numbers of decayed (D), missing (M), and filled (F) permanent teeth were 1.87 ± 1.95, 0.05 ± 0.29, and 0.09 ± 0.38, respectively.

Variable	Valid N	Mean	Confidence -95,00%	Confidence +95,00%	Median	Minimum	Maximum	Std.Dev.
D	201	1,87	1,60	2,14	2,00	0,00	12,00	1,95
M	201	0,05	0,01	0,09	0,00	0,00	3,00	0,29
F	201	0,09	0,04	0,15	0,00	0,00	2,00	0,38
DMFT	201	2,07	1,78	2,36	2,00	0,00	12,00	2,06

Table 2. The DMFT index.

Table 2.1 shows the DMFT index values (mean ± SD) according to sex. The mean DMFT indices were 1.95 ± 1.83 in males and 2.18 ± 2.25 in females.

Gender	DMFt Means	DMFt N	DMFt Std.Dev.
Male	1,95	93	1,83
Female	2,18	108	2,25
All Grps	2,07	201	2,06

Table 2. 1. Difference in DMFT index according to the sex of the children.

The DMFT index in females was higher than that in males (Z = −0.38; *P* > 0.05 [*P* = 0.70]).

Variable	Rank Sum Male	Rank Sum Female	U	Z	p-level	Valid N Male	Valid N Female
DMFt	9237,00	11064,00	4866,00	-0,38	0,70	93	108

Table 2. 2. Difference in DMFT index according to the sex of the children.

Table 3 shows the descriptive statistics of the OHI (Greene and Vermillion) in the 201 children. The mean OHI was 2.27 ± 0.74 (95% CI: 2.17–2.37); the average value was 2.50, and the value ranged from 0.00 to 3.00.

Variable	Valid N	Mean	Confidence -95,00%	Confidence +95,00%	Median	Minimum	Maximum	Std. Dev.
Plaque index / Green Wermilion	201	2,27	2,17	2,37	2,50	0,00	3,00	0,74

Table 3. The OHI index (Greene and Vermillion).

Table 3.1 shows the values (mean ± SD) of the plaque component of the OHI (Greene and Vermillion) according to the sex of the children. The mean values were 2.38 ± 0.72 in males and 2.18 ± 0.74 in females.

Gender	Plaque index / Green Wermilion / Means	Plaque index / Green Wermilion / N	Plaque index / Green Wermilion / Std.Dev.
Male	2,38	93	0,72
Female	2,18	108	0,74
All Grps	2,27	201	0,74

Table 3. 1. The plaque component of the OHI (Greene and Vermillion) according to the sex of the children.

The OHI was significantly higher in males than in females (Z = 2.67; *P* < 0.01 [*P* = 0.008]).

Variable	Rank Sum Male	Rank Sum Female	U	Z	p-level	Valid N Male	Valid N Female
Plaque index / Green Wermilion	10490,00	9811,00	3925,00	2,67	**0,008**	93	108

Table 3. 2. Difference in the values of the plaque component of the OHI (Green and Vermillion) according to the sex of the children.

Table 4 and graph 1 show the relationship between the number of bacterial colonies of *S. mutans* in 1 mL saliva and caries risk.

			S.Mutanscaries risk		Total
			Low caries risk	High caries risk	
S.Mutans	CFU<10 3-5	Count	18	0	18
		%	13,7%	0,0%	13,7%
	CFU ≥ 10 5	Count	0	44	44
		%	0,0%	33,6%	33,6%
	CFU > 10 5	Count	0	69	69
		%	0,0%	52,7%	52,7%
Total		Count	18	113	131
		%	13,7%	86,3%	100,0%

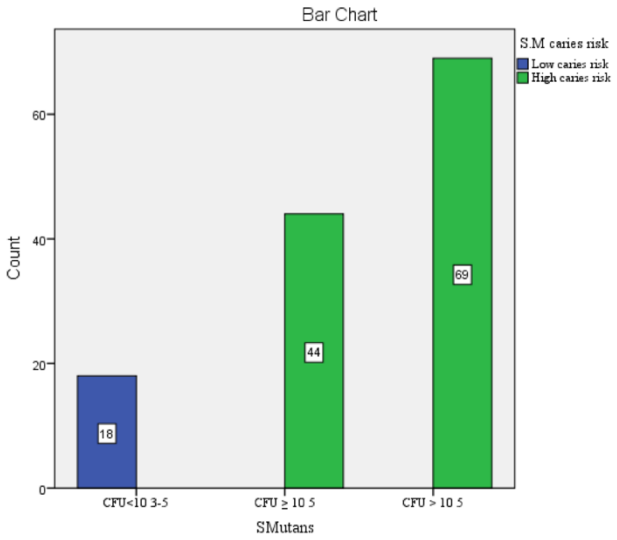

Table 4. *Streptococcus mutans* caries risk test.

Table 4.1 and graph 2 show the relationship between the number of bacterial colonies of *S. mutans* in 1 mL saliva and the sex of the children.

Of 46.60% males, 10.70% were at low risk and 35.9% were at high risk for caries. Furthermore, of the 53.40% of females, 3.10% were at low risk and 50.3% were at high risk for caries.

Upon cross-tabulation, a significant difference was observed in the number of *S. mutans* colonies in 1 mL saliva according to the sex of the children (Pearson χ^2 = 8.24; *P* < 0.05 [*P* = 0.02]).

			SMutans			Total
			CFU<10 3-5	CFU ≥ 10 5	CFU > 10 5	
Gender	Male	Count	14	19	28	61
		%	10,7%	14,5%	21,4%	46,6%
	Female	Count	4	25	41	70
		%	3,1%	19,1%	31,2%	53,4%
Total		Count	18	44	69	131
		%	13,7%	33,6%	52,7%	100,0%

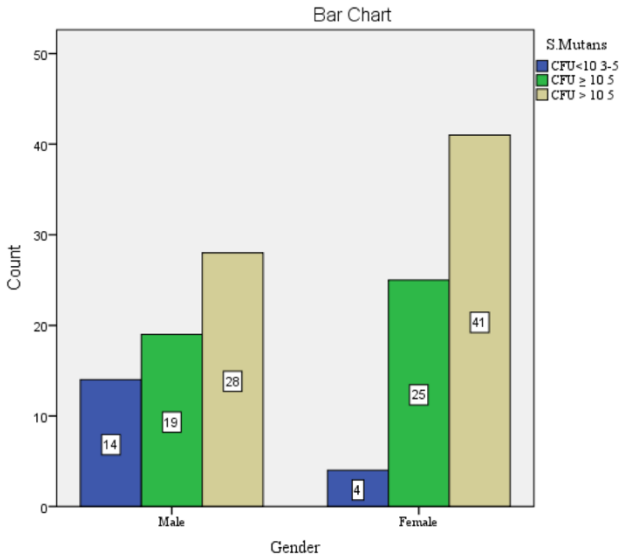

Table 4. 1. Cross-tabulation of the sex of children and *S. mutans* colonies.

Discussion

Our study focused on assessing the oral health of RAE children in the Republic of Kosovo, which is determined by the prevailing economic and social conditions of their lives. The economic and social situation in Kosovo is weak in general, impacting all groups of society. Nevertheless, given the specifics of tradition, culture, and social aspects, this study was focused on RAE children's oral health.

In this study, the mean dmft index was 3.86 ± 3.38; this value is higher than those reported from other countries: 2.082, Tirana, Albania;[24] 2.62 ± 1.62, Andimeshk, Iran;[25] 2.74 ± 0.09, Iran;[17] 3.01 ± 3.03, Portugal;[26] 3.23 ± 4.07, Egypt;[15] and 3.66 ± 3.13, Eastern Saudi Arabia.[14] However, values lower than this have also been reported from some regions: 3.94 ± 3.93, Sichuan, China[27] and 4.36 ± 3.763, Kosovo.[28]

The mean DMFT index in this study was 2.07 ± 2.06; this value is higher than those reported from other countries: 0.93 ± 1.35, Satao, Portugal;[26] 1.18 ± 0.97, Andimeshk, Iran;[25] 1.20 ± 1.488, Kosovo;[28] 1.36 ± 1.30, Rajasthan, India;[29] 1.43 ± 3.12, Egypt;[30] 1.5 ± 0.8, Uganda;[31] 1.6 ± 0.1, Ardabil, Iran;[17] and 1.94 ± 2.0, Eastern Saudi Arabia.[14] However, values lower than this have also been reported from some regions: 2.327, Tirana, Albania[24] and 4.76 ± 2.42 in private schools and 7.61 ± 2.86 in government schools, Bharatpur, India.[32]

We found high OHI, with a relatively high presence of dental plaque (2.27 ± 0.74), in the RAE children compared with the data reported by Begzati (1.52 in other children living in the Republic of Kosovo).[33] Moreover, the OHI is higher than those reported in other studies: 0.6, private school children in India;[34] 1.07 ± 0.67, Varna, Bulgaria;[35] and 1.60 ± 1.10, Egypt.[30]

In this study, we were particularly interested in the detection of cariogenic bacteria in the RAE children. The association of *S. mutans* with the prevalence of caries has been clearly established in several epidemiological studies.[18]

Our results indicate that *S. mutans* was present in 100% of the children. Furthermore, a large number of *S. mutans* colonies were found in a majority of children (86.3% at high risk for caries and 13.7% at low risk for caries). Our results regarding the presence of cariogenic bacterial colonies are consistent with the findings reported by Begzati (93% participants at high risk of caries).[33]

Various studies have reported different proportions of participants in whom *S. mutans* was detected in saliva. In a study conducted by Sakeenabi and Hiremath,[36] *S. mutans* was detected in 98.47% of study participants. Pimenta et al.[19] reported this proportion to be 86%, and Shanthi et al.[12] reported it to be 80.2%. Our study population was highly susceptible to caries development because of high salivary microbial counts, indicating that implementation of caries prevention programs is required.

Conclusions

Dental caries is a serious public health problem among children living in the Republic of Kosovo. So far, no prevention program focusing on oral health has been implemented or planned by the government or institutions of the Republic of Kosovo. This study highlights the importance and the great need for the implementation of preventive measures for children, especially for those belonging to the RAE community where oral health status is relatively poor. In the future, this group of children should be considered a priority in planning the implementation of

prevention/protection programs focusing on oral health.

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Declaration of Interest

The authors declare no conflict of interest.

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