Health

Determining Oral Health Status and Lifestyle-related Behaviors on the Example of 149 Children Aged 7 to 12 Years Old Living in Tbilisi

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Abstract

The level of oral hygiene in school-aged children in different countries is primarily low. Behavioral factors are the most important contributors to this low level of hygiene. It is also important to note that identifying the specific behaviors that significantly reduce disease burden is critical. The research was provided in Tbilisi, in public schools, to evaluate Oral health indicators (OHI, DMF, def), mean value of intensity of caries in school-aged children (7 to 12 years old), the role of behavioral factors in relation to oral hygiene and carbohydrate nutrition, and the popularity and relevance of preventive measures were determined. A cross-sectional study was conducted, where 149 children aged 7 to 12 were selected by simple random sampling from Tbilisi public schools. Evaluation of DEF, def, and S-OHI indices was carried out. Based on the oral health questionnaire, children's oral care and carbohydrate nutrition behaviors were assessed, as well as attitudes toward preventive interventions. SPSS version 23 software for statistical data processing was used for statistical analysis. On the example of 149 children in the 7-12-year-old population of Tbilisi, the simplified hygiene index is evaluated by the criterion average (1.56). Urban distribution affects the hygiene index, which is statistically significant (P=0.009). Caries intensity and hygiene index in primary and permanent dentition do not depend on gender - statistical certainty is not fixed. Caries intensity is "medium" for both permanent (3.2) and primary dentition (3.9), and the mean value of caries intensity for the whole population is 6.31, which is rated as "high." The popularity and relevance of preventive measures are low. Lifestyle behaviors related to both oral hygiene and carbohydrate-rich diets are not consistent with the recommendations provided by the FDI to reduce caries burden.

Keywords: oral hygiene, school-aged children, behavioral factors, - population

Introduction

Oral health changes throughout life from early childhood to old age and is an important, integral part of a person's overall health, well-being, and integration into society. Every year, the World Health Organization publishes the Global Oral Health Status Report (GOHSR, 2022), which provides an overview of the global burden of oral diseases. The report highlights the prioritization of oral health in international, regional, and national contexts.

According to the World Health Organization, oral diseases are considered the most common non-communicable diseases, affecting almost half of the world's population, which is 3.5 billion people (45%), even though they are largely preventable. The estimated number of cases of oral diseases in the world is 1 billion more than the total number of all five non-communicable diseases combined; that is, the prevalence of oral diseases is higher than any other non-communicable disease worldwide. The estimated number of cases of oral diseases in the world is 1 billion more than the total number of all five non-communicable diseases combined; that is, the prevalence of oral diseases is higher than any other non-communicable disease worldwide. About 2.5 billion people suffer only from untreated caries. The incidence of oral diseases is increasing globally and is exceeding the population growth rate. Statistics from the International Health Organization have shown that 60-90% of children and almost 100% of adults worldwide have caries. International studies such as the Global Burden of Disease Project (GBD), the International Agency for Research on Cancer (IARC), as well as the global WHO surveys, confirm that oral health has a global impact on the health and well-being of the population and the line Understands the existence of a higher burden of oral diseases on vulnerable groups in different societies. According to the World Health Organization (WHO. Global Status Report on Oral Health 2022), children are also among them.

Many studies have already proved that the level of oral hygiene among school-age children is primarily low in different countries of the world. Determining the state of oral health in school-aged children is a priority for public health in terms of proper planning of preventive measures for dental diseases. It is also crucial to promote oral health and improve lifestyle-related behaviors that affect the quality of life of people in adulthood. The most important factors that cause the low level of hygiene in school-aged children are behavioral factors. It is also essential to identify the specific behaviors that significantly reduce the disease burden (Mascarenhas, 2021; McGuire, 1996). Back in 2002, the FDI developed the MINIMAL INTERVENTION DENTISTY policy for the management of dental caries, which aims to promote preventive and less invasive measures for caries management (Frencken et al., 2012).

According to the definition of FDI, caries can be considered a "behavioral disease with a bacterial component." According to FDI evidence, reducing the intake of easily fermentable sugars and consuming carbohydrates no more than five times a day, removing plaque from the surface of the teeth with fluoride toothpaste for 3 minutes 2 times per day, and using dental floss are the most critical behaviors that lead to a reduction in the burden of dental caries in the world's diverse communities. Therefore, caries is a manageable disease, and its development and progression can be controlled. (FDI General Assembly September 2016).

A study examining oral care skills among children in 41 countries found significant differences in brushing frequency between North American and European countries. The American Dental Association (ADA) reported that 78% of American adults brush their teeth twice a day, compared to only 44% of children. Differences were also observed in European countries: 75% of adults brush their teeth twice a day in Sweden, Switzerland, the Netherlands, Germany, Denmark, and Norway, and 46% in Finland, Romania, Greece, Lithuania, Turkey, and Malta (Huget et al., 2012; Eaton et al., 2008),

Oral health in children is assessed by indicators such as the OHI-S simplified oral hygiene index, the DFM index for permanent teeth, and the def index for primary teeth (CM Marya 2011). Due to the urgency of the problem, an epidemiological study was conducted to study the oral health status of 7- to 12-year-old schoolchildren in Tbilisi city.

Methodology

The study was cross-sectional, where 149 children from 7 to 12 years old from Tbilisi public schools were selected by simple random sampling. DMF and def indices were evaluated by summing the number of carious, missing, and damaged teeth of the examined subjects. The mean value of the intensity of caries was determined by the ratio of the total scores to the number of examined subjects. The intensity of caries was evaluated according to the criteria provided by WHO. 0.0-1.1 points are considered very low, 1.2-2.6 - low, 2.7-4.4 medium, 4.5-6.5 - high, > 6.6 very high. Soft and hard plaque on the tooth was assessed by the Simplified Oral Hygiene Index (OHI-S), according to Green and Vermillion (1964). The vestibular or lingual surface of 6 teeth (1.1, 1.6, 2.6, 3.6, 3.1, 4.6) was evaluated using a 3-point system: 0 points - the absence of plaque, 1 point - the cervical part of the tooth or one-third of the tooth surface is covered with plaque, 2 points - half of the tooth surface is covered with plaque, 3 points - more than 2/3 or the whole tooth is covered with plaque.

Soft plaques (DI) and hard plaques (CI) were evaluated separately. By summing the scores and dividing them by 6, [A1] the soft plaque index (DI) and calculus index (CI) were obtained. The simplified oral hygiene index (OHI-S) was calculated by summing the obtained soft plaque and calculus indices.

Based on the oral health questionnaire, children's oral care and carbohydrate nutrition behaviors were assessed, as well as attitudes toward preventive interventions. The statistical data processing program SPSS version 23 was used for the statistical analysis of the research data. Frequency distribution was determined by univariate analysis and statistical tests; the chi-square test and t-test were used for bivariate analysis.

The research was conducted in 3 stages: In the first stage, informed consent was obtained by the interviewers from the guardian of the child. In the second stage, the guardians filled out an oral health questionnaire, which revealed their children's oral health behaviors and knowledge. In the third stage, children were observed (oral examination) in the school's medical room. Examination of the oral cavity took into account the determination of oral hygiene and caries intensity. During the oral cavity examination, the determination of oral hygiene and the intensity of caries were considered. A dental mirror was used in the research process (WHO recommendation for children's oral screening in schools and safety), the dental care of the patient was filled out (form N 4-220), dental plaques were stained with "Miradent" plaque identification solution (disclosing agent), which does not contain erythrosine, alcohol and is safe for screening studies in school conditions, and also it had been produced a photo protocol both before and after plaque staining (WHO, Irish Oral Health Services Guideline 2012).

Results

71 children (47.7%) out of 149 children aged 7 to 12 included in the study were female, and 78 children (52.3%) were male. Out of 149 examined children, 44 children (29.5%) were assessed as good (0.0 to 1.2) according to the simplified oral hygienist index criterion, 102 children (68.5%) were assessed as average (1.3-3.0), and 3 children (2%) were assessed as poor. The simplified hygiene index's average value in children aged 7 to 12 years is 1.56, which is evaluated by the criterion average.

Table №1.

N	S - OHI	N	Percentage (%)
1.	Good (0.0 – 1.2)	44	29.5
2.	Avarage (1.3- 3.0)	102	68.5
3.	Poor (3.1- 6.0)	3	2.0
	Total	149	100

The urban distribution of the excluded in Tbilisi schools was as follows: In the Vake district (Vera, Bagebi) - 29 children (19.5%). In Samgori district (Varketili and Lilo schools) – 50 children (33.6%). In Isani district - 28 children (18.8%). 32 children (21.5%) in Mtatsminda district. Others - 10 children (6.7%). The chi-square test was used to compare simplified oral hygiene indices in different districts of Tbilisi. A statistically significant difference was observed. The value of P is 0.009 (p<0.05), which means that urban distribution affects the hygiene index in the population. The best oral hygiene index was recorded in the Mtatsminda district, and the worst in the Samgori district. see Table 2.

The influence of gender on the hygiene index was studied. The mean hygiene index for females (71 children) was 1.55, and for males (78 children) it was 1.57. The value of P is 0.831 (P> 0.05), which means that the influence of gender on the hygiene index in the mentioned population of children is not statistically reliable. (Fig. 1)

The examined teeth of 149 children totaled 3507, of which 2659 were permanent, and 848 were primary teeth. 118 children had mixed dentition, and 31 children had permanent dentition.

Caries were detected in 399 permanent teeth, 78 teeth were restored, and 3 permanent teeth were extracted. Thus, the mean value of caries intensity is 3.2 (480/149= 3.22), which is evaluated as average intensity (from 2.7 to 4.4).

Among the primary dentition teeth, 363 carious teeth, 78 decayed teeth, and 20 prematurely extracted teeth due to carious lesions were observed. Thus, the mean value of caries Intensity for primary teeth is 3.9 (461/118=3.9), which is rated as average intensity.

Table 2

District	S-OHI								value
	Good		Average		Poor		Total		
	N	%	N	%		%	N	%	
Vake	12	41.4	16	55.2	1	3.4.	29	100	
Isani	7	25.0	21	75.0	0	0.0	28	100	
Samgori	5	10.0	43	86.0	2	4.0	50	100	
Mtatsmin-da	16	50.0	16	50.0	0	0.0	32	100	
Other	4	40.0	6	60.0	0	0.0	10	100	
Total	44	29,5	102	68.5	3	2.0	149	100	0.009

Figure 1. Dependence of Hygiene Index on Gender
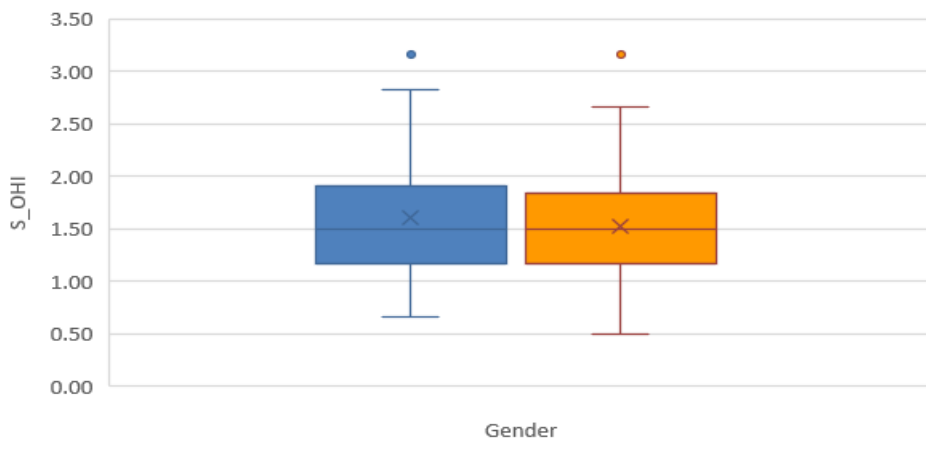
For the entire investigated population (149 children), the mean value of the intensity of caries is 6.31, which is considered high by the criterion (up to 4.5-6.5).

Our study also revealed variations in caries intensity across different districts of Tbilisi, as shown in Tab. 3. The district with the highest average in-

tensity of caries, at a rate of 7.18, was Samgori - a figure that exceeds the very high threshold (>6.6) set by the criterion. This highlights the need for targeted interventions in Samgori, which is characterized by unsatisfactory indicators of both the hygiene index and the average intensity of caries.

Table №3

District	Age	N	N D.	N F.	N M.	N c	N f	N e	DFM	def	DFM avar.	def avar,	FM+ def avar.
Vake	7-12	29	61	19	0	68	21	5	80	94	2.7	3.2	6
Samgori	7-12	50	150	21	1	156	19	12	172	187	3.44	3.74	7.18
Isani	7-12	28	62	10	0	64	18	3	72	85	2.57	3.0	5.6
Mtats-minda	7-12	32	107	18	2	55	7	0	127	62	3.9	1.9	5.9
other	7-12	10	19	10	0	20	13	0	29	33	2.9	3.3	6.2

The dependence of caries intensity on gender was studied by t-test. The mean value of caries intensity for permanent teeth was 3.55 in female patients and 2.88 in male children. The value of P is 0.095 (p>0.05), which means that the intensity of caries for permanent teeth does not depend on gender; it is not statistically reliable.

For primary teeth, the mean value of caries intensity for female patients (55 children) was 3.84; for male patients (63 children), it was 3.97. In this case, the value of P is 0.8 (p>0.05), which means that the dependence of caries intensity on gender is not statistically reliable. Thus, in the small population mentioned, the association between caries intensity and gender in primary and permanent teeth is not confirmed.

The results of the questionnaire were divided into three parts. In the first part of the questions, the eating habits of 149 children aged 7-12 years were studied. It was found that according to FDI recommendations, 36.2% of children brush their teeth twice a day. 58.4% spend 3 minutes or more for brushing the teeth, and 64.4% of respondents use fluoridated toothpaste. However, only 19% of the children enrolled in

the study fulfilled all three of these rules recommended by the FDI at the same time. The remaining 120 children (81%) do not fully perform any component of correct brushing. Only 3% of parents always help the child during the tooth brushing routine, 33% - sometimes, and 64% - never.

The second part of the survey studied which foods children choose (use) for daily consumption from the easily fermentable carbohydrate diet. For this purpose, 9 questions were asked. It was found that every day, 62% use fruits, 44% cakes, 27% Coca-Cola, 19% jams, 17% sugary chewing gum, 36% candies, 7% sugary milk, 54% sugary tea, and 0.7% sugary coffee. Summarizing the data determined that 19% of respondents eat different types of carbohydrate food 5 times a day or even more often.

After that, it was calculated how many percent fulfilled the recommendations of FDI in both hygiene and nutrition entirely, and it was found that only 15.43% of respondents brush and eat properly, which is 23 children out of 149 children. Moreover, 13.42%, or 20 children out of 149, brush incorrectly and, at the same time, are fed incorrectly. 67.11% (100 children) brush incorrectly and feed properly, 4.02% (6 children) brush correctly and feed incorrectly. (See fig. 2)Figure 2. Comparison of Oral Care Behaviors and Carbohydrate Diet Consumption Habits

Comparison of Oral Care Behavios and Carbonhydrate Diet Consumption Habits
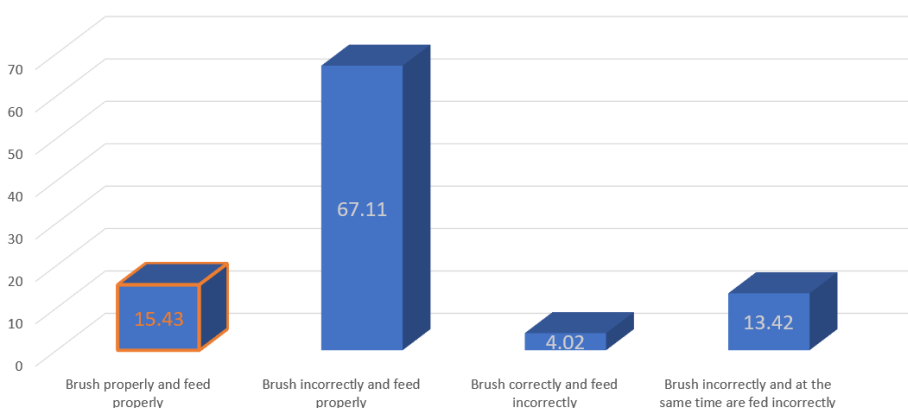
It was also interesting to find out whether children follow a 3-4 hour interval between meals. It was found that 51% of the respondents do not follow this rule. In this direction as well, we believe that parents need to be more aware and motivated. To the question whether they use any type of tobacco, an unambiguously negative answer was received.

In the third part of the questionnaires, the popularity of preventive interventions was investigated: 28% responded positively to whether the fissures were sealed, while 70% indicated that they had not. However, as a result of the observation of the oral cavity, it was determined that the sealing of the fissures was provided in only 10 children out of 149 examined children (6.7%). Among them, only 5 children (3.35%) had sealing all four 6th teeth. Out of 3507 teeth examined, 28 teeth were sealed. Thus, a 20% difference (error) was observed in subjective and objective research results.

8% of respondents (22 children) underwent remineralization therapy and received fluoride tablets or drops.

Thus, we conclude that the popularity of preventive measures in our studied population is very low, and it is necessary to motivate more involvement in this direction.

What was mentioned above is confirmed once again by the fact that when asked what was the reason for the last visit to the dentist, 51% of the respondents mentioned pain. Only 13% consult a dentist for prevention, which we consider to be very low. During the last six months, 56% of respondents visited the dentist once or twice, and 44%—never.

As for whether the population needs more informational support to maintain oral health, 82% of respondents answered positively. Increasing the level of awareness among the population and carrying out an information campaign among children was an accompanying component of our research.

Analysis of primary results

Through observation (physical examination), it was determined that the mean value of oral hygiene index (OHI-S) in girls (71 children - 47.7%) was 1.55 and in boys (78 children - 52.3%) was 1.57, the significance level of P is 0.831 (p >0.05), which means that the influence of gender on the hygiene index in the mentioned population of children is not statistically reliable. Out of 149 examined children, 44 children (29.5%) were assessed as good (0.0-1.2), 102 children (68.5%) were assessed as average (1.3-3.0), and 3 children (2%) were assessed as poor. Among 149 beneficiaries examined between 7 and 12 years of age, the simplified hygiene index's mean value was 1.56, which is evaluated by the criterion average. (WHO. Oral health surveys basic methods. 2013, CM Marya 2011, Rachmawati et al 2019).

The examined teeth of 149 children amounted to a total of 3507 teeth, including

2659 permanent teeth and 848 milk teeth. 118 children had variable dentition, and 31 children had permanent dentition. Caries were observed in 399 permanent teeth, 78 teeth, and 3 permanent teeth were removed. Thus, the average intensity of caries is 3.2 (480/149=3.22), which is evaluated as average intensity (Jafaridze et al., 2019; Rachmawati et al., 2019).

Among primary teeth, 363 carious teeth, 78 decayed teeth, and 20 prematurely extracted teeth due to carious lesions were observed. Thus, the mean value of caries Intensity for primary teeth is (461/118=3.9) 3.9 which is rated as average intensity (Jafaridze et al 2019; Rachmawati et al 2019). For the entire population (149 children), the average mean value of intensity is 6.31, which is considered high by the criterion.

In the example of 149 examined for the mentioned population, the mean value of caries intensity for permanent teeth for female patients (55 children - 48%) was 3.55, and for male patients (63 children - 52%), 2.88. The significance level of P is 0.095 (p>0.05), which means that the intensity of caries for permanent teeth does not depend on gender; that is, the influence of gender on the intensity of caries is not statistically reliable.

For milk teeth, the mean value of caries intensity for female patients (55 children - 48%) was 3.84, and for male patients (63 children - 52%) was 3.97. In this case, the P value is 0.8 (p>0.05), which means that the dependence of the intensity of caries on the gender of primary teeth is not statistically reliable.

Based on the questionnaires, the following data were determined: out of 149 examined patients, only 15.43% of respondents brush correctly and, at the same time, eat properly. In contrast, 13.42% brush incorrectly and eat incorrectly. 8% of respondents are familiar with preventive measures, and 13% of respondents go to preventive visits. Lifestyle behaviors, both regarding oral hygiene and carbohydrate-rich diets, are inconsistent with recommendations made by the FDI to reduce caries burden (Frencken et al., 2012).

56% of the surveyed population visits the dentist. Thus, the frequency of referral also revealed the low activity of the population we studied. Behaviors and knowledge regarding oral care and proper nutrition are unsatisfactory compared to those of developed countries, and the relevance of preventive measures is low, which may affect the caries burden in Tbilisi.

Acknowledgements

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