

Research article

Aspects of primary prevention of dental diseases in primary school childrenNatalia Li¹, Naken Kasiev², Aizhan Nakenova³, Dzhyldyz Ibraimova^{2,4}, Olga Bolbachan²¹International Higher School of Medicine of Kyrgyzstan, Bishkek, Kyrgyzstan²Department of Public Health and Health Care of the B. N. Yeltsin Kyrgyz-Russian Slavic University, Bishkek, Kyrgyzstan³Department of Therapeutic Dentistry, B.N. Yeltsin Kyrgyz-Russian Slavic University, Bishkek, Kyrgyzstan⁴Department of Public Health and Healthcare, I.K. Akhunbaev Kyrgyz State Medical Academy, Bishkek, Kyrgyzstan*(Received: December 2022**Revised: January 2023**Accepted: February 2023)*Corresponding author: **Naken Kasiev**. Email: sgn.mamatov@gmail.com**ABSTRACT**

Introduction and Aim: Oral health is a key indicator of overall health, well-being, and quality of life, which covers a number of diseases and conditions, including dental caries, periodontal disease, and tooth loss. This study evaluated the hygienic knowledge and skills of school children in oral hygiene in Kyrgyzstan.

Methods: 450 school children, including 231 boys and 219 girls aged 6–11 years from school No. 4 (Bishkek – Urban city) and school No. 1 (Lebedinovka, Chui – Rural village) were included. The obtained data are presented as the mean ± standard deviation. Two levels of probability $p < 0.05$, $p < 0.001$, and $p < 0.01$ were calculated.

Results: In a comparative analysis between schools, it was found that at school No. 4, school children are significantly more likely to brush their teeth twice a day (55.1 ± 3.3), and school children at school No. 1 once a day (52.0 ± 3.3), $p > 0.05$. In general, at school No. 4, more attention is paid to oral care (80.4 ± 2.6) than at school No. 1 (52.0 ± 3.3), $p < 0.001$.

Conclusion: It is necessary to conduct regular sanitary and educational activities among school children to improve the level of oral hygiene in children.

Keywords: Dental health; oral hygiene; oral diseases; school children; tooth decay.

INTRODUCTION

Reducing oral health concerns requires a reform of dental care to shift the focus from invasive dental treatment to the prevention and control of oral diseases based on human-centered care. Stronger policies are also needed to address the determinants of oral and non-communicable diseases, as well as to address inequalities through inclusive universal access to health care. The work in the field of oral hygiene focuses on strengthening the promotion of oral hygiene among the population and oral care within the primary health care system (1).

Oral health is a key indicator of overall health, well-being, and quality of life, which covers a number of diseases and conditions, including dental caries, periodontal disease, and tooth loss. According to the 2017 Global Burden of Disease Study, 3.5 billion people worldwide suffer from oral diseases (2).

The main target group for the implementation of the strategy for improving dental health is school-age children, since this period of life is especially important for the formation of beliefs and habits of a healthy lifestyle (3). In the world, more than 530 million children suffer from caries of baby teeth (4).

In Kyrgyzstan, despite the efforts being made to organize the treatment and prevention of dental caries and its complications in children, there is a decrease in the quality of dental care, its accessibility, the volume of preventive work is reduced, primarily due to the

increase in the volume of medical work and the closure of school dental offices (5).

Therefore, one of the most important tasks of health systems is to increase the level of dental health in the children's population. Planning of prevention programs should be carried out on the basis of a situational analysis of dental morbidity in the region and the factors affecting it. The low standard of living of the population and insufficient motivation to preserve health significantly contribute to the increase in the prevalence and intensity of major dental diseases (6).

One of the local factors of the occurrence of caries is unsatisfactory hygienic care of the oral cavity, which predetermined the relevance of conducting a questionnaire among school children. The objective of the study was to evaluate the hygienic knowledge and skills of school children in oral hygiene in Kyrgyzstan.

MATERIALS AND METHODS

Four hundred fifty school children, including 231 boys and 219 girls aged 6–11 years from school No. 4 (Bishkek – Urban city) and school No. 1 (Lebedinovka, Chui – Rural village) were included. Students from two schools were selected for the study by random selection. The intense indicator, representativeness error, visibility indicator, and the reliability were measured using the student's t test.

The obtained data are presented as the mean ± standard deviation. Statistical analysis was performed using Excel.XLSTAT v2020.1 (Microsoft, Addinsoft, France). The Mann–Whitney test was used to assess the significance of differences between the groups. Two levels of probability $p < 0.05$, $p < 0.001$, and $p < 0.01$ were calculated.

This study was approved by the Ethics Committee of the International Higher School of Medicine (Protocol No. 2 dated March 25, 2019). Informed consent was obtained from the parents of school children to conduct a survey of children.

RESULTS

At school No. 4, a significant majority of school children brush their teeth twice a day (55.1 ± 3.3) than

once a day (36.0 ± 3.2), $p < 0.001$, three or more times (8.9 ± 1.8), $p < 0.001$ (Table 1). There is no significant difference in the frequency of brushing teeth between boys and girls twice a day (32.4 ± 3.1 and 22.7 ± 2.7 , respectively) and once a day (18.7 ± 2.5 and 17.3 ± 4.6 , respectively). But at the same time, girls brush their teeth more than three times a day and more (4.9 ± 1.4) than boys (4.0 ± 1.3). Boys are significantly more likely to brush their teeth twice a day (32.4 ± 3.1) than once (18.7 ± 2.5) and three times or more (4.0 ± 1.3) $p < 0.001$. Among girls, no statistical differences were found between the frequency of brushing teeth once (17.3 ± 4.6) and twice a day (22.7 ± 2.7), except for the group of girls brushing their teeth three times or more (4.9 ± 1.4), $p < 0.001$.

Table 1: Frequency of brushing teeth in School No. 4 per 100 respondents

S. No.	Frequency of brushing teeth	Gender				Total (N = 225)	
		Boys (n=124)		Girls (n=101)		n	M ± m
		n	M ± m	n	M ± m		
1.	Once a day	42	18.7 ± 2.5	39	$17.3 \pm 4.6^*$	81	36.0 ± 3.2
2.	Twice a day	73	32.4 ± 3.1	51	$22.7 \pm 2.7^*$	124	55.1 ± 3.3
3.	Three or more times	9	4.0 ± 1.3	11	$4.9 \pm 1.4^*$	20	8.9 ± 1.8

All data are $M \pm m$ = mean ± standard deviation and n = frequency. $p < 0.05 = *$, $p < 0.001 = **$.

Thus, at School No. 4, the majority of school children brush their teeth twice a day, both boys and girls. With the frequency of brushing teeth once or twice a day, there are no significant statistical differences between boys and girls.

In school No. 1, most of the cases, school children carry out hygienic brushing of teeth once a day (52.0 ± 3.3) and twice a day (45.3 ± 3.3), more than three times or more (2.7 ± 1.0), $p < 0.001$ (Table 2).

Table 2: Frequency of tooth brushing by school children of school No. 1 per 100 respondents

S. No.	Frequency of brushing teeth	Gender				Total (n=225)	
		Boys (n=107)		Girls (n=118)		n	M ± m
		n	M ± m	n	M ± m		
1.	Once a day	61	27.1 ± 2.9	56	$24.9 \pm 2.8^*$	117	52.0 ± 3.3
2.	Twice a day	44	19.5 ± 2.6	58	$25.8 \pm 2.9^*$	102	45.3 ± 3.3
3.	Three or more times	2	0.9 ± 0.6	4	$1.8 \pm 0.8^*$	6	2.7 ± 1.0

All data are $M \pm m$ = mean ± standard deviation and n = frequency. $p < 0.05 = *$, $p < 0.001 = **$.

Among boys, there were no statistical differences between the frequency of brushing teeth once (27.1 ± 2.9) and twice a day (19.5 ± 2.6), with the exception of boys brushing their teeth three times or more (0.9 ± 0.6), $p < 0.001$. A similar trend was observed among girls (24.9 ± 2.8 and 25.8 ± 2.9 , and 1.8 ± 0.8 , respectively, $p < 0.001$). There was no significant difference between boys and girls in the frequency of brushing teeth, $p > 0.05$.

In a comparative analysis between schools, it was found that at school No. 4, school children are significantly more likely to brush their teeth twice a day (55.1 ± 3.3), and school children at school No. 1 once a day (52.0 ± 3.3), $p > 0.05$.

Thus, at school No. 1, school children brush their teeth with almost the same frequency once a day and twice a day, while no significant differences between boys and girls were revealed.

In general, in school children of school No. 4, the duration of brushing teeth <1 minute (44.9 ± 3.3) and 1–2 minutes (46.7 ± 3.3) occurred with almost the same frequency, $p > 0.05$, ≥3 minutes - 8.4 ± 1.8 school children, $p < 0.001$ (Table 3).

Table 3: Frequency of tooth brushing duration among school children of School No. 4 per 100 respondents

S. No.	Frequency of brushing teeth	Gender				Total (n=225)	
		Boys (n=124)		Girls (n=101)		n	M ± m
		n	M ± m	n	M ± m		
1.	<1 minute	62	27.5 ± 2.9	39	$17.3 \pm 4.6^*$	101	44.9 ± 3.3
2.	1–2 minutes	51	22.7 ± 2.7	54	$24.0 \pm 2.8^*$	105	46.7 ± 3.3
3.	≥3 minutes	11	4.9 ± 1.4	8	$3.5 \pm 1.2^*$	19	8.4 ± 1.8

All data are $M \pm m$ = mean \pm standard deviation and n = frequency. $p < 0.05 = *$, $p < 0.001 = **$.

It was reliably revealed that brushing teeth took <1 minute longer in boys (27.5 ± 2.9) than in girls (17.3 ± 4.6). 22.7 ± 2.7 boys and 24.0 ± 2.8 girls brush their teeth for 1–2 minutes, ≥ 3 minutes 4.9 ± 1.4 and 3.5 ± 1.2 , respectively.

Most boys spend <1 minute brushing their teeth (27.5 ± 2.9), 1–2 minutes (22.7 ± 2.7) boys, and ≥ 3 minutes (4.9 ± 1.4 boys), $p < 0.001$. Girls pay more attention to their teeth and clean mostly in 1–2 minutes (24.0 ± 2.8), <1 (17.3 ± 4.6) girls, $p > 0.05$, and ≥ 3 minutes (3.5 ± 1.2 girls), $p < 0.001$.

Thus, at school No. 4, the duration of brushing teeth, in general, for school children was 1–2 minutes, for boys <1 minute, and for girls 1–2 minutes.

In school No. 1, 2.2 times more school children brush their teeth for <1 minute (66.7 ± 3.0) than 29.3 ± 3.0 school children brushing their teeth for 1–2 minutes, $p < 0.001$, only $4.0 \pm 1.3 - \geq 3$ minutes, $p < 0.001$ (Table 4). There were no significant differences between boys and girls in brushing their teeth for <1 minute (36.4 ± 3.2 and 30.2 ± 3.0 , respectively, $p > 0.05$), ≥ 3 minutes (11.3 ± 0.7 and 2.7 ± 1.0 , respectively, $p < 0.001$). Girls (19.5 ± 2.6) brush their teeth for 1–2 minutes more than boys (9.8 ± 1.9), $p < 0.001$.

Boys mostly brush their teeth for <1 minute (36.4 ± 3.2), 1–2 minutes (9.8 ± 1.9), > 3 minutes (11.3 ± 0.7), $p < 0.001$. Girls often brush their teeth for <1 minute (30.2 ± 3.0) than 1–2 minutes (19.5 ± 2.6), $p < 0.001$, and ≥ 3 minutes (2.7 ± 1.0), $p < 0.001$.

Table 4: Frequency of tooth brushing duration in school children of school No. 1 per 100 respondents

S. No.	Frequency of brushing teeth	Gender				Total (n = 225)	
		Boys (n = 107)		Girls (n = 118)		n	M \pm m
		n	M \pm m	n	M \pm m		
1.	<1 minute	82	36.4 ± 3.2	68	$30.2 \pm 3.0^*$	150	66.7 ± 3.0
2.	1-2 minutes	22	9.8 ± 1.9	44	$19.5 \pm 2.6^{**}$	66	29.3 ± 3.0
3.	≥ 3 minutes	3	11.3 ± 0.7	6	$2.7 \pm 1.0^{**}$	9	4.0 ± 1.3

All data are $M \pm m$ = mean \pm standard deviation and n = frequency. $p < 0.05 = *$, $p < 0.001 = **$.

Thus, at school No. 1, most of the school children brush their teeth for <1 minute, while there are no significant differences between boys and girls. Both boys and girls were more likely to brush their teeth for <1 minute.

A comparative analysis of the duration of brushing teeth in school children of two schools showed that children of school No. 1 (66.7 ± 3.0) brush their teeth <1 minute more compared to school children of school No. 4 (44.9 ± 3.3), $p < 0.001$. At the same time, boys in two schools (27.5 ± 2.9 and 36.4 ± 3.2 , respectively) are more than girls (17.3 ± 4.6 and 30.2 ± 3.0 , respectively). Up to 1-2 minutes, most of the school children of school No. 4 (46.7 ± 3.3) brush their teeth more than school children of school No. 1 (29.3 ± 3.0), $p < 0.001$. Moreover, boys in school No. 4 (22.7 ± 2.7)

are more compared to boys in school No. 1 (9.8 ± 1.9), $p < 0.001$. There were no significant differences between the girls of the two schools (24.0 ± 2.8 and 19.5 ± 2.6), $p > 0.05$.

At School No. 4, school children change their toothbrushes more often once every six months (54.2 ± 3.3) than once every three months (32.9 ± 3.1), and once a year (12.9 ± 2.2), $p < 0.001$ (Table 5).

There was no significant difference between boys and girls who change their toothbrushes once every three months (14.7 ± 2.3 and 18.2 ± 2.5 , respectively) and once a year (5.3 ± 1.4 and 7.5 ± 1.7 , respectively). Further, it was found that boys are significantly more likely to change toothbrushes (35.1 ± 3.1) once every six months than girls (19.1 ± 2.6), $p < 0.001$.

Table 5: Frequency of changing toothbrushes by school children of School No. 4 per 100 respondents

	Frequency of changing toothbrushes	Gender				Total (n=225)	
		Boys (n=124)		Girls (n=101)		n	M \pm m
		n	M \pm m	n	M \pm m		
1.	Once every three months	33	14.7 ± 2.3	41	$18.2 \pm 2.5^*$	74	32.9 ± 3.1
2.	Once every six months	79	35.1 ± 3.1	43	$19.1 \pm 2.6^{**}$	122	54.2 ± 3.3
3.	Once a year	12	5.3 ± 1.4	17	$7.5 \pm 1.7^*$	29	12.9 ± 2.2

All data are $M \pm m$ = mean \pm standard deviation and n = frequency. $p < 0.05 = *$, $p < 0.001 = **$.

Most of the boys change their toothbrush every six months (35.1 ± 3.1) once every three months (14.7 ± 2.3), and once a year (5.3 ± 1.4), $p < 0.001$. Girls are

more likely to change once every six months (19.1 ± 2.6) than once every three months (18.2 ± 2.5), and once a year (7.5 ± 1.7), $p < 0.001$.

Thus, at school No. 4, school children often change their toothbrushes once every six months (54.2 ± 3.3) and once in every three months (32.9 ± 3.1). There was no significant difference between boys and girls who change their toothbrushes once every three months and once a year. Boys changed toothbrushes more often than girls. Most of the boys changed their toothbrushes once every six months, girls once every six months, and three months.

At school No. 1, the majority of school children changed their toothbrush once a year (56.0 ± 3.3) and every six months (35.5 ± 3.1), $p < 0.001$, after three months they changed the brush only 8.4 ± 1.8 school children, $p < 0.001$ (Table 6). Once a year they change the toothbrush. There are more girls (35.5 ± 3.1) than boys (20.5 ± 2.6), $p < 0.001$. Boys (23.5 ± 2.8) than girls (12.0 ± 2.1) change the brush more often than girls (4.9 ± 1.4), $p < 0.001$. In three months, more girls (4.9 ± 1.4) changed once than boys (3.5 ± 1.2), $p > 0.05$.

Table 6: Frequency of changing toothbrushes by school children of school No. 1 per 100 respondents

	Frequency of changing toothbrushes	Gender				Total (n=225)	
		Boys (n=107)		Girls (n=118)		n	M ± m
		n	M ± m	n	M ± m		
1.	Once every three months	8	3.5 ± 1.2	11	$4.9 \pm 1.4^*$	19	8.4 ± 1.8
2.	Once every six months	53	23.5 ± 2.8	27	$12.0 \pm 2.1^{**}$	80	35.5 ± 3.1
3.	Once a year	46	20.5 ± 2.6	80	$35.5 \pm 3.1^{**}$	126	56.0 ± 3.3

All data are $M \pm m$ = mean ± standard deviation and n = frequency. $p < 0.05 = *$, $p < 0.001 = **$.

Boys change their toothbrushes mostly every six months (23.5 ± 2.8) and once a year (20.5 ± 2.6), $p > 0.05$, and only 3.5 ± 1.2 boys - once every three months, $p < 0.001$. Girls often change toothbrushes once a year (35.5 ± 3.1), every six months - 12.0 ± 2.1 , $p < 0.001$, and only 4.9 ± 1.4 girls every three months, $p < 0.01$.

Thus, in school No. 1, the overwhelming majority of school children change their toothbrushes once a year and every six months. Girls change their toothbrushes more once a year, as well as once every three months, than boys. But once every six months, boys change brushes more often than girls. Boys change toothbrushes mostly every six months and once a year. Girls were changed more often once a year and once every six months.

Analysis of the frequency of changing toothbrushes showed that most school children at school No. 4 change brushes once every six months (54.2 ± 3.3), and at school No. 1 once a year (56.0 ± 3.3), $p > 0.05$.

The determining factor in the development of major dental diseases is the unsatisfactory hygienic

condition of the oral cavity. School children from school No. 4 in most cases perform oral care (80.4 ± 2.6) and only 19.5 ± 2.6 cases do not take care of the oral cavity, $p < 0.001$ (Table 7).

There were no significant differences in oral care between boys (43.5 ± 3.3) and girls (36.9 ± 3.2), $p > 0.05$. The effectiveness of preventive measures depends on hygiene methods and means. Of the care products, chewing gum is used more often (58.2 ± 3.2), while more boys (33.3 ± 3.1) than girls (24.9 ± 2.8), $p < 0.05$. 13.7 ± 2.2 school children are rinsed with water, of which 8.0 ± 1.8 boys and 5.7 ± 1.5 girls, $p < 0.01$. Special means for hygienic purposes are used by 8.4 ± 1.8 school children, and girls in 6.2 ± 1.6 cases, boys in 2.2 ± 0.9 cases, $p < 0.01$.

Thus, 80.4 ± 2.6 school children take care of the oral cavity at school No. 4. At the same time, there were no significant differences between boys and girls. Of the care products, chewing gum is more often used (58.2 ± 3.2), rinsing with water 13.7 ± 2.2 school children, and special means 8.4 ± 1.8 school children.

Table 7: Oral care by school children of School No. 4 per 100 respondents

	Gender				Total (n=225)	
	Boys (n=124)		Girls (n=101)		n	M ± m
	n	M ± m	n	M ± m		
Performing oral care						
1.	98	43.5 ± 3.3	83	$36.9 \pm 3.2^*$	181	80.4 ± 2.6
Rinsing the oral cavity with special means						
2.	5	2.2 ± 0.9	14	$6.2 \pm 1.6^{***}$	19	8.4 ± 1.8
Using chewing gum						
3.	75	33.3 ± 3.1	56	$24.9 \pm 2.8^{**}$	131	58.2 ± 3.2
Rinsing with water						
4.	18	8.0 ± 1.8	13	$5.7 \pm 1.5^{**}$	31	13.7 ± 2.2
Not performing oral care						
5.	26	11.5 ± 2.1	18	$8.0 \pm 1.8^*$	44	19.5 ± 2.6

All data are $M \pm m$ = mean ± standard deviation and n = frequency. $p < 0.05 = *$, $p < 0.001 = **$, $p < 0.01 = ***$.

In school No. 1, 52.0 ± 3.3 school children take oral care, and 48.0 ± 3.3 do not pay attention to additional hygiene measures. Rinsing with water is used in 40.9

± 3.2 cases, of which more girls (30.7 ± 3.0) than boys (10.2 ± 2.0), $p < 0.001$ (Table 8).

Table 8: Oral care by school children of school No. 1 per 100 respondents

	Gender				Total (n = 225)	
	Boys (n = 107)		Girls (n = 118)			
	n	M ± m	n	M ± m	n	M ± m
Oral care						
1.	39	17.3 ± 4.6	78	$34.7 \pm 3.1^{***}$	117	52.0 ± 3.3
Rinsing the oral cavity with special means						
2.	2	0.9 ± 0.6	4	$1.8 \pm 0.8^*$	6	2.7 ± 1.0
Using chewing gum						
3.	14	6.2 ± 1.6	5	$2.2 \pm 0.9^{**}$	19	8.4 ± 1.8
Rinsing with water						
4.	23	10.2 ± 2.0	69	$30.7 \pm 3.0^{***}$	92	40.9 ± 3.2
Lack of oral care						
5.	68	30.2 ± 3.0	40	$17.7 \pm 2.5^{***}$	108	48.0 ± 3.3

All data are $M \pm m$ = mean \pm standard deviation and n = frequency. $p < 0.05 = *$, $p < 0.001 = **$, $p < 0.01 = ***$.

Chewing gum is used by 8.4 ± 1.8 school children, more for boys (6.2 ± 1.6) than for girls (2.2 ± 0.9), $p < 0.01$. Rinsing with water was observed in 2.7 ± 1.0 school children, girls (1.8 ± 0.8) more than boys (0.9 ± 0.6), $p < 0.05$.

Thus, at school No. 1, only half of the respondents use special oral care products. Rinsing with water is used more often, and more for girls than boys.

In general, at school No. 4, more attention is paid to oral care (80.4 ± 2.6) than at school No. 1 (52.0 ± 3.3), $p < 0.001$. At school No. 4, chewing gum is used more as an additional hygiene product (58.2 ± 3.2), and in school No. 1 rinsing with water (40.9 ± 3.2), $p < 0.001$.

DISCUSSION

Daily oral care with the help of specialized hygiene products, such as toothbrushes, toothpastes, elixirs, and mouthwashes will help maintain oral health and prevent the development of diseases of hard and periodontal tissues (7). Many studies reported the need for high-quality daily hygiene (7, 8) and, undoubtedly, the level of oral hygiene depends on brushing teeth (9). The most affordable and effective means for cleaning teeth from microbial biofilm is a toothbrush (10). Most of the studies recommended changing the toothbrush every 3–4 months (10, 11).

Most of the school children brush twice a day, the fewer children with bleeding gums. Therefore, one of the subjective indicators of dental health is the percentage of children who follow the recommended brushing regimen twice a day, a highly informative indicator of behavioral risk factors affecting oral health (9).

The most important part of hygiene and prevention of various dental diseases is individual oral hygiene,

which includes regular and thorough removal of dental deposits from the surface of the tooth and gums using various care products. The low level of sanitary, and hygienic knowledge and skills, and the lack of motivation among school children to participate in preventive programs, determine the increase in the prevalence and intensity of dental diseases, primarily in children and adolescents (12, 13).

The results obtained on the hygienic knowledge and skills of school children in oral hygiene indicate an insufficient level of hygienic education of school children, which requires the introduction of programs for the prevention of dental diseases among school-age children and regular sanitary and educational activities in schools that contribute to reducing the number of initial carious lesions and improving the level of oral hygiene in children. It is important to note that in the hygienic education of school-age children, more attention should be paid to the formation of proper dental cleaning techniques (10, 14, 15).

The use of the most modern and traditional methods of oral hygiene in the comprehensive prevention of caries in its initial manifestations gives hope to patients to provide effective protection of the hard tissues of the tooth, periodontal and oral mucosa (16).

CONCLUSION

When developing school dental programs, it is important to determine the sequence of stages of measures to improve the hygienic knowledge and skills of school children with the participation of a pediatric dentist, the introduction of innovative recommendations, and new approaches in providing therapeutic and preventive care in a school dental office. So, it is necessary to conduct regular sanitary

and educational activities among school children to improve the level of oral hygiene in children.

CONFLICTS OF INTEREST

None.

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