



CAN DENTAL SCREENING OF PRESCHOOLERS WITH OR WITHOUT EDUCATION OF THE PARENTS IMPROVE CHILDREN'S ORAL HEALTH? THE LONGITUDINAL STUDY RESULTS

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Abstract. The aim of the research was to study the results of 2 preventive programs including dental screening of preschool children with or without education of their parents in oral health. **Material and methods.** The study was organized in the Bukhara region of the Uzbekistan Republic; 6 kindergartens were randomly selected, and 478 children aged 3-6 years participated, after the informed consents of their parents were obtained. Only dental screening of the children was performed in 3 kindergartens (238 children, group SC), and dental screening with additional education of the parents in oral health was performed in 3 kindergartens (240 children, group SE). In group SC the parents received written recommendations about the needs of their children in dental care. In group SE the parents were additionally invited to special educational lecture on the issue of children's oral health improvement. After 8 months the dental examination was organized for all the children again. The proportions (%), dmft mean-value with standard error ($M \pm m$), caries incidences and dental care index were calculated. Chi-square criterion was used to assess the differences between the groups at $p < 0.05$. **The results:** The first examination revealed high caries prevalence and the need for treatment in both groups, mean dmft was 3.86 ± 0.11 in SC group and 4.02 ± 0.12 in SE group, $p > 0.05$. The proportions of dmft were an average 85.1% of dmft in SC group and 84.7% in SE group, $p > 0.05$; filling rate (ft) was 10.6% and 11.3% respectively, $p > 0.05$. At the second examination new caries lesions were revealed in both groups, caries increments were an average 1.58 ± 0.07 and 1.08 ± 0.05 in SC and SE groups ($p < 0.05$), ft was 21.9% and 35.6% respectively ($p < 0.05$). **Conclusion:** Dental screening insignificantly improved oral health in children. Additional education of the parents on the oral health matter improved oral health in children more than dental screening alone. However, in both groups the children had new caries lesions and the proportions of untreated teeth were higher than the ratio of filled teeth.

Keywords: caries, dental screening, education, parents, dmft, children

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МОЖЕТ ЛИ СТОМАТОЛОГИЧЕСКИЙ СКРИНИНГ ДОШКОЛЬНИКОВ С ОБУЧЕНИЕМ РОДИТЕЛЕЙ ИЛИ БЕЗ НЕГО УЛУЧШИТЬ ЗДОРОВЬЕ ПОЛОСТИ РТА ДЕТЕЙ? РЕЗУЛЬТАТЫ ЛОНГИТУДНОГО ИССЛЕДОВАНИЯ

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Аннотация. Целью исследования было изучение результатов 2 профилактических программ, включающих стоматологический скрининг детей дошкольного возраста с обучением или без обучения их родителей гигиене рта. **Материал и методы.** Исследование было организовано в Бухарской области Республики Узбекистан; случайным образом были отобраны 6 детских садов, в которых приняли участие 478 детей в возрасте 3-6 лет после получения информированного согласия их родителей. Только стоматологический скрининг детей проведен в 3 детских садах (238 детей, группа SC), а стоматологический скрининг с дополнительным обучением родителей гигиене рта проведен в 3 детских садах (240 детей, группа SE). В группе SC родители получили письменные рекомендации о потребностях своих детей в стоматологической помощи. В группе SE родители были дополнительно приглашены на специальную образовательную лекцию по вопросу улучшения здоровья рта у детей. Через 8 месяцев для всех детей снова был организован стоматологический осмотр. Были рассчитаны пропорции (%), среднее значение кпу со стандартной ошибкой ($M \pm m$), прирост кариеса и индекс стоматологической помощи. Для оценки различий между группами использовался критерий Chi-square при $p < 0.05$. **Результаты:** Первое обследование выявило высокие показатели распространенности кариеса и потребности в лечении в обеих группах, среднее значение кпу составило $3,86 \pm 0,11$ в группе SC и $4,02 \pm 0,12$ в группе SE, $p > 0,05$. В структуре кпу кариозные зубы (к) составляли в среднем 85,1% в группе SC и 84,7% в группе SE, $p > 0,05$, пломбированные зубы (п) – 10,6% и 11,3% соответственно, $p > 0,05$. При повторном обследовании в обеих группах были выявлены новые кариозные поражения, прирост кариеса составил в среднем $1,58 \pm 0,07$ и $1,08 \pm 0,05$ в группах SC и SE ($p < 0,05$), пропорция пломбированных зубов (п) – 21,9% и 35,6% соответственно ($p < 0,05$). **Заключение:** Стоматологический скрининг значительно улучшил здоровье рта у детей. Дополнительное просвещение родителей по вопросам гигиены рта улучшило здоровье рта у детей больше, чем один только стоматологический скрининг. Однако в обеих группах у детей появлялись новые кариозные поражения и пропорции невылеченных кариозных зубов были больше, чем пломбированных зубов.

Ключевые слова: кариес, стоматологический скрининг, образование, родители, кпу зубов, дети.

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INTRODUCTION

Oral diseases, especially early childhood caries (ECC), are widely prevalent in the children in many countries around the world [1,2]. Untreated dental caries in primary teeth took the tenth place among all human diseases which burden healthcare systems [3]. About 400-600 million children have untreated caries in primary teeth [4]. Dental caries can lead to teeth loss, inflammation, sepsis, impairment of the function of speech, chewing, etc.; it negatively impacts children's self-perception and quality of life in children and their families [5,6]. Children with severe caries in primary teeth have high caries rate in permanent dentition [7]. Low filling rate was reported in 3-5 year old children [8]. Caries preventive programs and dental care service for children is an important goal of paediatric dentistry [9]. Many dental educational programs are introduced for pregnant women, parents of toddlers, young children, kindergarten children, for preschool and schoolchildren [10,11].

In dental educational programs for different population groups main attention is paid to children's oral hygiene, fluoride toothpaste use, carbohydrate consumption restriction, and regular dental examination [12]. However, the results of oral health educational programs are inconsistent [13].

Children who attend kindergartens are the special population group which can be regular examined by a dentist. It was suggested that mandatory dental screening helps improve oral health in children [14]. However, the results of dental screening in children are controversial [15].

THE AIM of the research was to study the results of 2 preventive programs including dental screening of preschool children with or without the education of the parents in oral health.

MATERIAL AND METHODS

The preventive programs were approved by the local authorities of the Bukhara region and the Healthcare ministry of the Uzbekistan Republic.

Selection of the participants

The study was organized in 6 kindergartens, which were randomly selected from 3 districts: Bukhara city (2 kindergartens), Alatsky district (2 kindergartens) and Karakulsky district (2 kindergartens). About 80 children attended every kindergarten. The children aged 3-6 years were recruited for the study and their parents signed informed consents. The criteria for the inclusion into the study were the following: the age from 3 to 6 years, regular kindergarten attendance, parents' informed consents obtaining. The criteria for the exclusion were: the age under 3 years or over 6 years, irregular kindergarten attendance, parent's informed consent absence or the refusal to continue the participation in the study. Only the dental screening was done for the children in 3 kindergartens, one in each of 3 districts (238 children, group SC). The dental screening with the additional education of the parents in oral health was performed in 3 kindergartens too, one in each of 3 districts (240 children, group SE).

Dental screening

The first and the second dental examination of all the children was conducted in the kindergartens by one experienced and qualified general dentist. Only visual examination was used. The infectious safety was maintained by the dentist (and the dental assistant) via the use of disposable gloves for the examination, masks, disinfectant solutions, etc. The algorithm of dental screening of the children includes external examination, evaluation of the maxilla-facial region, revealing malocclusion, oral mucosa and periodontal diseases, dental caries and non-cariou pathologies, etc. The results of dental examination were registered in medical cards of the children. According to the results of the screening the referral letters were given to the parents of all the children. The letters were personalized and included the information about every child's needs in preventive and treatment dental care in a dental office (with the address of the nearest dental clinic). The referral letters were passed to the parents by the kindergarten's personnel.

Educational program on oral health for the parents

The parents of the examined children of group CE were invited to special lectures which were organized in the same kindergartens. The lectures were devoted to children's oral health improvement by regular oral hygiene, fluoride toothpaste use, carbohydrate restriction in the diet, need for visiting a dentist not only for dental treatment but also for preventive examination, fluoride varnish and fissure sealants application. The referral letters were given to the parents after the lectures.

The program's results assessment

After 8 months after the first screening the second dental examination of the children was done in the same kindergartens for the same children. The comparison of the data of the first and second dental examinations was the basis of the programs' efficiency evaluation. The mean-value of caries increments was the criterion for caries prevention; filling rate (ft proportion in dmft) was the criterion for the parents' compliance with the recommendations in the referral letters to visit a dental office for dental treatment.

Statistical analysis

The Microsoft Excel-19 was used for statistical analysis. Proportions (%), mean-values (dmft, caries increments) with standard error ($M \pm m$) were calculated. Chi-square criterion was used to assess the differences between the groups at $p < 0.05$.

THE RESULTS

The first dental examination revealed high caries prevalence in primary teeth, which increased with the age of the children and was 100% in the 6-year-olds. The dmft-value also increased from the age of 3 years to 6 years in children of both groups. Mean dmft was 3.86 ± 0.11 in group SC and 4.02 ± 0.12 in group SE. The differences in caries prevalence, dmft-indexes between study-groups in the children of all ages were not significant statistically ($p > 0.05$) (Table 1).

Caries prevalence and dmft-value in children at the first dental screening

Table 1.

Age, years	Caries prevalence		dmft-index	
	group SC	group SE	group SC	group SE
	%	%	$M \pm m$	$M \pm m$
3	59.5	58.4	1.84 ± 0.12	1.88 ± 0.12
4	91.2	89.7	3.39 ± 0.18	3.19 ± 0.17
5	98.1	97.5	4.09 ± 0.22	4.36 ± 0.23
6	100	100	6.12 ± 0.37	6.66 ± 0.39
An average	87.2	86.4	3.86 ± 0.11	4.02 ± 0.12

In both groups most affected primary teeth were decayed(dt) and accounted from 76-78% of dmft-index in the 6-year-olds to 86-91% of dmft-index in the 3-4-year-olds,

an average 86.1% in group SC and 84.7% in group SE, $p>0.05$ (Table 2).

Table 2.
The proportions of dt, mt and ft in the dmft-index in the groups at the first dental examination of the children

Age, years	Group SC			Group SE		
	Percentage (%) from dmft			Percentage (%) from dmft		
	dt	mt	Ft	dt /ds	mt/ms	Fts
3	91.2	5.1	3.6	86.4	8.2	5.3
4	88.2	1.2	10.6	92.8	0.6	6.6
5	86.3	3.8	9.9	83.1	0.9	16.1
6	78.6	2.9	18.5	76.6	6.2	17.1
An average	86.1	3.2	10.6	84.7	3.9	11.3

The ratios of the fillings (ft) were low in the 3-year-olds (5.1% in group SC and 8.2% in group SE, $p>0.05$) and increased by the age of 6 years only to 18.5% and 17.1% respectively, $p>0.05$. The proportions of prematurely extracted primary teeth (mt) were from 1.2 to 5.1% in group SC and from 0.6% to 8.2% in group SE, an average less than 4% in both groups.

At the second dental examination new caries lesions were revealed in the children of all the ages, more often in group SC than in group SE, an average 1.58 ± 0.07 and 1.08 ± 0.05 respectively, $p<0.001$. In both groups the lowest caries increments was in the 3-year-olds, the highest one in the 6-year-olds (Table 3).

Table 3.
Caries increments in the children of the groups after 8 months

Group	New carious lesions in the children aged:				
	3 years	4 years	5 years	6 years	An average
	M±m	M±m	M±m	M±m	M±m
SC	0.92±0.03	1.11±0.03	1.30±0.03	3.00±0.08	1.58±0.07
SE	0.55±0.03	0.76±0.04	0.83±0.04	2.17±0.11	1.08±0.05
P	<0.001	<0.001	<0.001	<0.001	<0.001

The proportions of decayed teeth (dt) were from 59.6% in the 6-year-olds to 83.4% in the 3-year-olds in group SC and

from 50.9% to 72.9% in group SE respectively (Table 4).

Table 4.
The proportions of dt, mt and ft in the dmft-index in the groups at the second dental examination of the children

Age, years	Group SC			Group SE		
	Percentage (%) from dmft			Percentage (%) from dmft		
	dt	mt	Ft	dt	mt	Ft
3	83.4	3.9	12.7	72.9	9.8	17.3
4	77.6*	3.7	18.7*	62.2*	3.6	34.2*
5	70.5*	6.4	23.1*	52.6*	5.3	42.1*
6	59.6	13.2	27.2	50.9	9.4	39.7
An average	70.2*	7.9	21.9*	53.8*	10.6	35.6*

*the differences between the groups are significant statistically, $p<0,05-0,001$

The filling rates (ft) were from 12.7% in the 3-year-olds to 27.2% in the 6-year-olds in group SC (an average 70.2%) and from 17.3% to 39.7% in group SE respectively (an average 53.8%). The ratios of prematurely extracted primary teeth were different, an average 7.9% in SC group and 10.6% in SE group ($p>0.05$).

DISCUSSION

The results of our research revealed high level of caries prevalence in the 3-6-year-old children in the Bukhara region of the Uzbekistan Republic which reached 100% in the 6-year-olds [18]. These data correspond with the reports of other authors about over 90% ECC prevalence in some regions of Southeast Asia and Russia [16]. Meanwhile, in the 3-6-year-old children in our study the mean dmft score was 3.86-4.02, whereas in the countries with comparable ECC prevalence dmft score was higher – 8.4-9.1. In most developed countries of the world caries prevalence in primary teeth and dmft-value are significantly lower. So, it is clear that children in the study

region are in need of caries preventive programs.

The majority (more than 90%) of carious affected primary teeth remains untreated in most children all over the world. In our study the proportions of decayed teeth in dmft-index were from 76.6% to 92.8% at the first dental examination of the children. In the 6-year-olds dt-ratios were lower than in other age groups, which can be explained by the cumulative effect.

High ECC prevalence and low dental filling rate are the main reasons to conduct caries preventive programs in children [17]. However, the level of the provision of children with caries preventive programs is insufficient in many countries [19]. We applied the dental screening program (1st program) for the children in 3 kindergartens. The children were examined by a dentist and the parents were provided with recommendations on caries prevention and dental treatment needs of their children. Despite having the referral letter to the dental clinics, the parents demonstrated a low level of compliance. In consequence, the children did not receive the necessary dental care (caries prevention and treatment measures). New

caries lesions were revealed in all the children at the second dental examination (after 8 months) and the majority of the primary teeth remained untreated, although the proportions of decayed teeth (dt) in the children decreased an average from 86.1% to 70.2%. These data match the results of the parents' questioning which was conducted by Baker et al., who demonstrated low parents' efforts to implement health-protective practices for their children. Moreover, Arora et al. in their review confirmed that school dental screening programs did not improve children's attendance of dental setting for teeth treatment or receiving preventive procedures. The same results were confirmed by other researchers.

The 2nd program was applied also in 3 kindergartens and included special lectures for the parents on the issue of caries prevention in children in addition to dental screening. The results of this program were better than the results of dental screening alone. After 8 months after the 2nd program's application the mean-value caries increments were 1.4-1.7 times lower and the proportions of the fillings (ft) were 1.4-1.8 times higher in comparison with the same indexes in the children who received dental screening without parents' education. These findings underline the value of education of parents in oral health programs. Many other researchers demonstrated the positive influence of educational programs for parents on children's oral health improvement. In contrast, the other authors highlighted the obstacles for preventive plan realization and the moderate effect of parents' oral health education and training.

Despite better results of dental screening with additional parents' education than dental screening alone, the results of both programs were far from ideal. Caries increment was high, especially in the 5-6-year-old children; the ratios of untreated teeth were higher than the ratios of filled teeth, especially in the 3-year-old children (6.6 times higher after the screening, 4.2 times higher after the screening with the parents' education). Obtained data substantiate the need for more active caries prevention programs for preschool children which will include evidence-based measures (fluoride use, fissure sealants, etc.) [20].

CONCLUSION

Dental screening insignificantly improved oral health in children. Additional education of the parents on the oral health matter improved oral health in children more than dental screening alone. However, in both groups the children had new caries lesions, especially in the age of 5-6 years, and the proportions of untreated teeth were higher than the ratio of filled teeth, especially in the 3-year-olds.

CONFLICT OF INTERESTS

The authors declare no conflict of interests.

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AVAILABILITY OF DATA AND MATERIALS

All data generated or analysed during this study are included in this published article.

AUTHORS' CONTRIBUTIONS

All authors contributed to the design and interpretation of the study and to further drafts. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All applicable international, national, and/or institutional guidelines for the care and use of animals were followed.

CONSENT FOR PUBLICATION

Not applicable.

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КОНФЛИКТ ИНТЕРЕСОВ

Авторы заявляют, что данная работа, её тема, предмет и содержание не затрагивают конкурирующих интересов.

ИСТОЧНИКИ ФИНАНСИРОВАНИЯ

Авторы заявляют об отсутствии финансирования при проведении исследования.

ДОСТУПНОСТЬ ДАННЫХ И МАТЕРИАЛОВ

Все данные, полученные или проанализированные в ходе этого исследования, включены в настоящую опубликованную статью.

ВКЛАД ОТДЕЛЬНЫХ АВТОРОВ

Все авторы внесли свой вклад в подготовку исследования и толкование его результатов, а также в подготовку последующих редакций. Все авторы прочитали и одобрили итоговый вариант рукописи.

ЭТИЧЕСКОЕ ОДОБРЕНИЕ И СОГЛАСИЕ НА УЧАСТИЕ

Были соблюдены все применимые международные, национальные и/или институциональные руководящие принципы по уходу за животными и их использованию.

СОГЛАСИЕ НА ПУБЛИКАЦИЮ

Не применимо.

ПРИМЕЧАНИЕ ИЗДАТЕЛЯ

Журнал "Интегративная стоматология и челюстно-лицевая хирургия" сохраняет нейтралитет в отношении юрисдикционных претензий по опубликованным картам и указаниям институциональной принадлежности.

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