

Influence of age and sex on children's ability to incorporate oral health habits after educational activities in schools

Influência da idade e gênero na capacidade de crianças em incorporar hábitos de saúde bucal após atividades educativas nas escolas

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Abstract

Introduction: The promotion of oral health is one of the pillars of preventive strategies in the emergence of dental changes in schoolchildren, as it is easier to incorporate health and hygienic habits in schools. However, to date, little is understood about the influence of age and sex on children's ability to understand, improve, and adhere to oral health habits after educational actions in schools. **Objective:** To verify the influence of different age groups and sex on children's ability to incorporate oral health habits after educational activities in schools. **Materials and Methods:** 173 children from a public State school, located in the South Region of the Capela do Socorro sub-prefecture of the city of São Paulo were evaluated and divided according to age into three groups: 6-7 years (n = 62), 8-9 years (n = 47), and 10-11 years (n = 27). Questionnaires were applied comprising the following topics: demographic and socioeconomic data, eating habits and oral hygiene, as well as the Simplified Oral Hygiene Index (SOHI). The educational strategy was performed with lectures, theater, and stories about brushing and oral hygiene. After two and four weeks of the educational action all data were reevaluated. **Results:** There was a significant difference between the 6 to 7 year age group compared to the 8 to 9 year and 10 to 11 year groups, with the youngest being more responsive and effective in oral health and hygiene, after two and four weeks of educational action at school. Regarding sex, there were no differences within and between groups. **Conclusion:** Schoolchildren of different age groups: 6 to 7, 8 to 9, and 10 to 11 years, showed effective improvements in oral health after two and four weeks of an educational action at school, regardless of sex. The incorporation of oral health habits was better in the 6 to 7 year age group. **Keywords:** oral health; children; school, age.

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Resumo

Introdução: A promoção da saúde bucal é um dos pilares de estratégias preventivas no surgimento de alterações dentárias nas crianças escolares, visto sua maior facilidade na incorporação de hábitos saudáveis e higiênicos nas escolas. Porém, até o momento pouco se compreende sobre a influência da idade e gênero sobre a capacidade das crianças na compreensão, melhora e aderência à saúde bucal após ações educativas nas escolas. **Objetivo:** Verificar a influência de diferentes faixas etárias e gênero na capacidade das crianças em incorporar hábitos de saúde bucal após atividades educativas nas escolas. **Casuística e Métodos:** Foram avaliadas 173 crianças de uma Escola Estadual pública pertencente a região Sul da subprefeitura da Capela do Socorro da cidade de São Paulo, os quais foram divididas, de acordo com a faixa etária, em três grupos: 6-7 anos (n=62); 8-9 anos (n=47) e 10-11 anos (n=27). Em seguida, foram aplicados questionários aos responsáveis legais pelas crianças, compondo os seguintes tópicos: dados demográficos e sócioeconômicos, hábitos alimentares e de higiene bucal, bem como o Índice de Higiene Oral Simplificado (SOHI). A estratégia educativa foi realizada por meio de palestras, teatros, histórias sobre escovação e higiene bucal. Após duas e quatro semanas da ação educativa todos os dados foram reavaliados. **Resultados:** Houve uma diferença significativa entre a faixa etária dos 6 a 7 anos de idade em relação aos grupos de 8 a 9anos e de 10 a 11 anos, sendo os mais jovens mais responsivos e efetivos na saúde e higiene bucal, após duas e quatro semanas da ação educativa na escola. Em relação aos gêneros, não se observou diferenças intra e inter grupos. **Conclusão:** Crianças escolares de diferentes faixas etárias: 6 a 7, 8 a 9 e 10 a 11 anos, apresentaram melhoras efetivas de saúde bucal após duas e quatro semanas da ação educativa na escola, independente do gênero em cada faixa etária. A incorporação do hábito de saúde bucal foi melhor nos mais jovens com faixa etária dos 6 aos 7 anos de idade..

Palavras-chave: saúde bucal; crianças; escola; idade.

Introduction

Oral health educational actions have been performed in the Brazilian school environment since the beginning of the twentieth century in 1912, when the oral health program was implemented in the city of São Paulo¹. The school environment stimulates critical knowledge and the incorporation of healthy habits into the oral care of children, and can have repercussions in their families^{2,3}.

Much of the importance of oral health in schoolchildren comes from the high prevalence of dental caries and periodontal diseases that affect children and adolescents in the different cycles of life, and whose evolution results in losses of dental elements. Thus, is considered a public health problem that requires preventive programs by means of guidance and motivation on oral hygiene care to prevent dental disease in children and potentially high costs of specialized dental treatments^{4,5,6}.

The literature shows that oral hygiene educational actions lasting 15 minutes in preschool children from 4 to 6

years of age, after a short period of four weeks, led to significant improvements in the practice of oral hygiene and cleaning of hands and nails, and that girls presented greater effectiveness when compared to boys⁶. Another study carried out by Ferrazzano et al., (2008)⁴, also in children, verified expressive improvement in oral health after a week of oral health educational actions, being higher in girls, however, results remained low after three months. The authors concluded that it was an effective method for establishing good oral health habits for children.

Still in this line of reasoning, Ribeiro, et al., (2009)² evaluated a preventive and motivational educational method applied to children of the 5th year of elementary school of the public network of the city of Ribeirão Preto, SP. Thirty-three schoolchildren aged 9 to 11 answered a questionnaire for characterization of the sample and to evaluate knowledge and oral health habits at two moments, before and after an educational activity. The authors concluded that the preventive educational program was able to arouse children's interest, in addition to promoting

intellectual development and contributing to the motivation of hygiene habits, but for the activity to be effective, prevention programs needed to be performed periodically. Farias et al. (2009)⁵ in determining the impact of health education and oral hygiene in 257 schoolchildren from 7 to 15 years of age, before and after 4 months of an oral health educational action, used the indices DLF-S (delayed, lost and filled - surface), the visible plate index (VPI), and the gingival bleeding index. The level of information on oral health of schoolchildren had no relation to the results of the evaluated indices, that is, more informed schoolchildren did not always practice the best oral hygiene. Other studies have verified that schoolchildren between 7 and 10 years of age who received educational actions through theater, history, lectures, and competitions related to oral health effectively presented improved oral habits and knowledge on the theme^{7,8,9}.

Although oral health educational actions promote benefits in schoolchildren, their awareness is still low in the realization of oral health, and the necessary actions may be better understood by different ages and sexes, since studies do not separate according to age groups and sexes. The school has a fundamental role in guidance and training of children, which extends to the family environment. The institution of educational-preventive activities for oral health at school, besides being simple, easy to apply, and low cost, is of great value in the prevention of biological-dependent oral diseases¹⁰. Thus, the objective of this study was to verify the influence of different age groups and sexes in the capacity of children to incorporate oral health habits after educational activities in schools.

Materials and methods

Sample and type of study

The sample consisted of schoolchildren from 6 to 11 years of age,

enrolled in a public state school in the southern region of the subprefecture Capela do Socorro in São Paulo (SP). One hundred and seventy-three children participated in the study, allocated into three groups, according to their age: children of 6-7 years (n = 62), children of 8-9 years (n = 47), and children of 10-11 years (n = 27), who participated in educational-preventive activities (AEP). From a single listing of children by age, they were randomly assigned to the groups.

All data on the children were collected after approval from the Local Research Ethics Committee (number: 2015699) and after the parents/guardians of the child had agreed and signed the term of free and clarified consent to carry out the study, respecting the ethical principles governed by Resolution 466/12 of the National Council of Ethics in Research-CONEP. The data were collected initially and after two and four weeks of the oral health educational action. It is worth mentioning that the questionnaires were applied to the people legally responsible for the children.

Research design

This is a prospective analytical study, through educational interventions on oral health in schoolchildren.

Inclusion and Exclusion Criteria

The inclusion criteria of children in the study were absence of systemic diseases and use of drugs. The systemic diseases considered were: acute infectious childhood diseases that promote a drop in organic resistance, such as influenza, chickenpox, rubella, and any other infectious disease; fever with known cause or not; blood dyscrasia (anemia and hemophilia); diabetes mellitus; cardiopathies; rheumatic fever; and renal diseases. With respect to the drugs, drugs that could alter the salivary flux such as antihistamines (for allergies); sedatives (for cough); antispasmodics (for pain relief); drugs for asthma; and drugs

containing sucrose such as syrups and tonics were considered¹¹.

Procedures

Socioeconomic and demographic data, general health, and oral health habits of the children were evaluated through their legal guardians, who signed the ICT. For this, the plaque adhered to the teeth of the schoolchildren was assessed, through pigmentation with 0.7% basic fuchsin (Eviplac– Solução Evidenciadora de Placa Bacteriana– Biodinâmica Química e Farmacêutica LTDA; ANVISA Reg: 10298550044) and applied to the dental surface with cotton swabs. The exams were performed by the main researcher in light and airy environments with natural lighting. Next, the simplified oral hygiene index (SOHI) was evaluated to verify: the vestibular surfaces of the teeth 16 (first upper right permanent molar), 11 (upper right permanent central incisor), 26 (first upper left permanent molar), and 31 (lower left permanent central incisor), and lingual surfaces of the teeth 36 (first lower left permanent molar) and 46 (first lower right permanent molar) - in the absence of these teeth, the corresponding deciduous teeth or neighboring teeth are used as a reference. Each surface receives a code from 0 to 3 where zero indicates that the surface does not present biofilm, code one, the biofilm is present in the cervical third, code two, the biofilm is present in the cervical and medium thirds, and code three, the biofilm covers the three-thirds of the dental surface, ranging from 0 to 2 (without biofilm to its presence). These values are added together and divided by the number of teeth examined, to obtain the mean, which can be classified as: satisfactory, regular, and unsatisfactory.

Oral Health Educational Action

Educational activity: After the initial evaluation, the educational activity in oral health was carried out with the children of the different age groups. The teaching

resources used in the educational activities were interactive games, macro-models, brush and toothpaste, posters, and lectures. This activity lasted 60 minutes. The activities include emphasized themes such as dental caries, gingivitis, brushing with toothpaste, use of dental floss, and relationship of diet with dental caries. Clear and objective language was used in order to ensure the children were attentive, receptive, and motivated to the acquisition of new oral health habits.

Preventive action: Children received a kit containing a toothbrush, fluoride toothpaste (1,100 ppmf), and an oral health guideline. Supervised brushing was performed individually and the children were oriented to spit the toothpaste out. These educational actions and the brushing technique were based on studies carried out by Barreto et al. (2013)¹¹ and Frencken et al. (2001)¹³.

Statistical analysis

The data collected were submitted to Friedman's variance analysis to compare the simplified oral hygiene index (SOHI) values between the groups at the pre-moments, and after two and four weeks of the educational action. This analysis was applied separately for the female and male schoolchildren for each of the age groups. The Mann Whitney test was used to compare the male and female groups of schoolchildren, in relation to the indices observed at each of the moments of evaluation, separately for each age group. The Kruskal-Wallis analysis of variance was used to compare the groups in relation to the differences between the SOHI values, in the pre-guidance moments and after 4 weeks. This analysis was performed separately for female and male students. The level of significance adopted was 5%

Results

In Table 1, it can be verified that there was no difference when comparing male and female children, except for the age group of 6 to 7 years in the pre-guidance period, where boys presented higher rates

than girls, meaning they had a greater amount of dental biofilm. The Friedman analysis of variance (Table 1) showed an improvement in hygiene after the educational action and that it remained in the 4-week period in the 6 to 7 year and 10 to 11 year groups, in both sexes (female and male) and only in females in the group of 8 to 9 years. However, an important finding in this same group of 8 to 9 years was that in the four-week period the indices were similar to those collected before the intervention. In the Kruskal-Wallis variance test (Table 1), it was observed that the female sex presented statistical differences

between: 6 to 7 years and 10 to 11 years ($p < 0.05$), in which the lower age group presented increased improvement in oral health in relation to the higher age group (10 to 11 years). For the male sex, statistical differences were found between: 6 to 7 years and 8 to 9 years ($p < 0.05$) and 10 to 11 years ($p < 0.05$), with the youngest group again presenting significant improvement when compared to the older groups. Regardless of the sex, the youngest group presented better results of the simplified oral hygiene index (SOHI) which reflects greater learning in the oral health education intervention.

Table 1 – Elementary Schools, according to sex and age group in relation to the simplified oral hygiene index (SOHI).

Age (years)	Mann Whitney (female – F x male - M)						Friedman's Analysis of Variance (pré x 2 weeks x 4 weeks)	
	Pre		Post-2 week		Post-4 week		F	M
	F	M	F	M	F	M		
6-7	1.6	1.9	0.89	1.13	1.09	1.25	$\chi^2 r=23.16$ $p < 0.0001$	$\chi^2 r=39.59$ $p < 0.0001$
p	0.010*		0.211		0.102		$2 \times 4 < \text{pre}$	$2 \times 4 < \text{pre}$
z	2.5628 (F<M)		1.249		1.6314			
8-9	1.4	1.5	0.92	0.91	1.08	1.23	$\chi^2 r=23.13$ $p < 0.0001$	$\chi^2 r=15.86$ $p < 0.0001$
p	0.504		0.957		0.208		$2 \times 4 < \text{pre}$	$2 < 4$
z	0.6673		0.0537		1.2578			
10-11	1.3	1.4	1.02	1.13	1.24	1.44	$\chi^2 r=13.46$ $p < 0.0012$	$\chi^2 r=15.86$ $p < 0.0105$
p	0.364		0.498		0.254		$2 \times 4 < \text{pre}$	$2 < 4$
z	0.9077		0.6769		1.1385			

Table 2 shows that there were no statistical differences between sexes within the different age groups. In the period of 4 weeks (Table 3), there was no statistical

difference between sexes within the age groups, however when comparing regardless of sex, a significant improvement in students aged 6 to 7 years was observed.

Table 2 - Schoolchildren according to sex and age groups in relation to the number and percentage improvement in the simplified oral hygiene index in the educational pre-action period and after 2 weeks.

Age	Improved (%)		Not Improved		chi square test	
	F	M	F	M	F	M
6-7	23 (82)	39 (81)	5	9	$\chi^2 = 0.00, p = 0.833$	
Total	62 (81.5)		14			
8-9	29 (85)	18 (72)	5	9	$\chi^2 = 1.57, p = 0.354$	
Total	47 (79)		14			

10-11	18 (72) 9 (69)	5 9	$x^2=0.03, p=0.847$
Total	27 (71.1)	14	

Table 3 - Schoolchildren according to sex and age groups in relation to the number and percentage improvement in the simplified oral hygiene index in the educational pre-action period and after 4 weeks.

Age	Improved (%)		Not Improved		chi square test	
	F	M	F	M	F	M
6-7	24 (85)	43 (89)	4	5	$x^2=0.25, p=0.892$	
Total	67 (88.2)		9			
8-9	22 (64)	16 (64)	12	9	$x^2 = 0.01, p=0.826$	
Total	38 (64,4)		21			
10-11	10 (40)	7 (53)	15	6	$x^2 = 0.66, p=0.636$	
Total	17 (44.7)		21			

The statistical analysis showed no significant difference between male and female children in any age groups, in the periods of 2 and 4 weeks.

Discussion

Oral health education is fundamental to increase knowledge and adherence to behavioral changes in schoolchildren for healthier oral habits. According to some authors, these changes should be instituted in the initial phase of school life, since children are more receptive and learn easily, allowing the consolidation of what they learn^{1,2}. Corroborating with the authors, in the present study, the educational activity associated with the prevention of oral health was more effective and responsive in the younger age groups, with those of 6 to 7 years demonstrating the most effective improvement after 2 and 4 weeks of educational action at school. This appears to emphasize even more the fundamental role that the school plays in the guidance and formation of the child as a future citizen¹⁰.

Some studies in the literature have addressed specific age groups when considering the effectiveness of oral health educational actions of schoolchildren.

Barreto et al., (2013)¹¹ evaluated 38 children aged 3 to 5 years and the results showed that an educational - preventive activity is effective for the studied context, however for habits to be perpetuated, continuity of the program and parental participation are required. Antônio et al., (2015)⁸ studied 112 children aged 7 to 10 years and found that shortly after the health education intervention, comic books were the most effective strategy, however, in general, the educational methods (lectures, theater, and macro models) did not influence the knowledge acquired in the studied sample. Although this study did not compare methods of educational actions, care was taken to use the same methods applied in the study of Antônio et al. (2015)⁸, and the influence of the younger age group for greater gain in oral health effectiveness was observed, which was not differentiated between sexes.

Regarding sex, in the current study there were no differences for the variables evaluated, however, there is a large body of literature verifying that the female sex demonstrates greater effectiveness and ease of adherence and improvement in oral health^{4,6}. It is possible that the lack of differences between sexes observed in the current study is due to the standardization of

the different age groups, which promoted small variations between the groups evaluated.

Several studies show that educational actions are able to promote the interest of children and adolescents^{12,13}. Ribeiro, et al. (2008)⁵ evaluated a preventive and motivational educational method applied to children in the 5th year of elementary public school in the city of Ribeirão Preto, SP. Thirty-three students aged between 9 and 11 years answered a questionnaire to characterize the sample and to evaluate knowledge and habits of oral health at two moments, before and after an educational activity. The authors concluded that the preventive educational program was able to arouse children's interest, in addition to promoting intellectual development and contributing to the motivation of hygiene habits. However, for the activity to be effective, prevention programs should be carried out periodically, corroborating with the findings of the current study.

Oliveira and Martini et al. (2009)¹⁴, correlated the application of fluoridated mouthwashes with the SOHI of sixty-one children and adolescents aged 6 to 13 years from an elementary school in the city of Nova Aurora/PR. In the results, younger students showed worse results and mouthwashes with fluoride did not change the SOHI. It was concluded that

mouthwashes should be associated with health education with themes such as: etiological factors, causes and consequences of bacterial plaque, hygiene techniques, maintenance hygiene instruments, and the risk of not cleaning properly. It was not the focus of the current study to verify mouthwash, but differently, the younger age groups were the most responsive for improving oral health, regardless of sex.

Although the current study did not evaluate the influence of teachers and family members, the literature reveals that preventive oral health actions should be given great importance and are essential in the school environment and could be reiterated by teachers, who play an active role in solidifying children's oral hygiene habits. In addition, the participation of parents is essential, to reinforce the activity carried out with the children at school^{15,16,17}.

Conclusion

Schoolchildren from different age groups: 6 to 7, 8 to 9, and 10 to 11 years, presented effective oral health improvements after two and four weeks of educational action at school, regardless of sex in each age group. The incorporation of the oral health habit was better in the youngest age group of 6 to 7 years.

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