Original Research

DENTAL MEDICINE

Impact of tooth brushing rhyme on the oral hygiene status of 6-7 year old children - an educational intervention study

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Abstract

Aim. To determine the impact of a newly composed tooth brushing rhyme on oral hygiene status of 6 to 7-year-old children.

Methods. A total of 60 children in the age range of 6 to 7 years were randomly assigned to either group 1 (experimental) or group 2 (control). Group 1 children were given brushing instructions and made to memorize a newly composed tooth brushing rhyme; the control group received only routine brushing instructions. Baseline oral hygiene status of all the children was assessed using the oral hygiene index simplified (OHI-S) and its modification for primary dentition. Oral prophylaxis was performed, and OHI was further recorded at intervals of seven, 14 and 28 days for all the children. The data was tabulated, compared, and analyzed statistically.

Results. There was no significant difference in the baseline OHI-S scores between the two groups ($P \geq 0.05$). However, there was a significant difference in OHI-S scores in all the considered time intervals after the intervention. Based on the two components of OHI-S, a statistically significant difference was noted only in debris scores (7 days: $P=0.04$, 14 days: $P \leq 0.001$, 28 days: $P \leq 0.001$).

Conclusion. The newly composed tooth brushing rhyme had a significant impact on the oral hygiene scores of children, and can be recommended in the routine educational curriculum of pre-primary children.

Keywords: education, oral health, rhyme, school, tooth brushing

Introduction

Cognitive development is the process by which a child learns to reason, solve problems, and think consciously. Development of cognitive skills and verbalization are interdependent [1]. Thus, the pace of language and scope increase dramatically with cognitive development. Similarly, vocalization is essential for the advancement of thinking, social cognition, and self-regulation of health behavior in children [2]. There are four different types of language play; playing with sounds and noises, linguistic systems (involving word meanings or grammatical constructions), conventions of speech, rhymes, and words [3]. Effective early year activities that help children in developing their language and communication skills include reciting rhymes, drawing pictures, singing songs, telling stories, games and dramas [4,5]. The positive impact of oral health education in the form of games, and dramas is reported in the literature [6,7]. However, the effect of oral health education in the form of rhymes, which children love because of rhythm and repetition, has not been evaluated so far. Training, in the form of rhymes recitation, has the ability to enhance the child's language, boost the literary skills, and collaterally impact oral health practices [8,9]. Hence, the present study is carried out to determine the effectiveness of tooth brushing rhyme in improving the oral hygiene practices of 6-7-year-old children.

Material and methods

Tooth brushing rhyme (represented in Figure 1)

The newly composed rhyme describes the areas that need to be brushed by the children and was tuned to attract 6-7-year-old children.

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Figure 1. Brushing rhyme.

Study design

The present study was an explanatory, superiority trial with parallel study design and an allocation ratio of 1:1.

The complete list of the non-government schools in Nellore city was obtained from the Mandal Education Officer. Schools with more than one branch, similar tuition fee structure and those with the recruitment of children in the age range of 6-7 years were segregated. The authorities of all the schools who fulfilled the above mentioned inclusion criteria were consulted, and detailed information of the study protocol was provided. From those who gave informed written consent, one school (along with the branches) was randomly selected using the lottery method. The two branches of the selected school were randomly assigned (using coin toss) to the experimental and control groups, and children were randomly selected using a table of random numbers to each group. The experimental group was assigned as group 1 and was made to learn by heart the composed tooth brushing rhyme along with the routine oral hygiene instructions.The control group was designated as group 2 and received only routine oral hygiene instructions.

Prior to any form of intervention, the baseline oral hygiene status of all the children was assessed, by two investigators (SP and AS), using the oral hygiene index simplified (OHI-S) and its modification for primary dentition [10]. Oral prophylaxis was performed for all the children; the status of oral hygiene was reassessed by the same investigators at regular intervals of 7, 14 and 28 days. The data was tabulated, and analyzed statistically.

Statistical analysis

The data was entered in the Microsoft excel spread sheet 2010. The statistical analysis was performed using SPSS 17.0 version for Windows (Chicago, III, USA). The normality of the data was analyzed using Shapiro-Wilk test. The mean difference in the OHI-S scores (including debris and calculus components) between baseline and the follow-up examinations for each group (intragroup comparisons) were analyzed using the paired t-test. On the other hand, the mean difference between the two groups in all the considered time intervals (intergroup comparisons) was assessed using unpaired t-test. The level of statistical significance was set at 0.05.

Results

A total of 60 children, 30 in each group were recruited into the study. The intergroup comparisons of oral hygiene index scores and the components, in all the considered time intervals, are represented in tables I-III. The intragroup comparisons in the considered time intervals, for both the groups, are presented in table IV. The mean baseline OHI-S index score in group 1 and group 2 were 1.02±0.42 and 1.01±0.48, respectively; the difference was not statistically significant (P=0.93). However, a statistically significant difference was noted after intervention in all the considered intervals, with group 1 showing lower scores (Table III). The individual components of OHI-S showed the difference only in debris scores, and no significant difference with calculus (Table I and II).

Table I. Intergroup comparison of debris index scores (component of oral hygiene index simplified).

Total sample (N=60)	Debris index simplified Mean ± SD (95% CI)		
	Group 1	Group 2	P value
Base line	0.77 ± 0.18 (0.68 – 0.85)	0.81 ± 0.32 (0.67 – 0.97)	0.52^{NS}
7 days	0.23 ± 0.21 (0.13 – 0.32)	0.39 ± 0.24 (0.27 – 0.50)	0.04^{*}
14 days	0.30 ± 0.19 (0.20 – 0.39)	0.60 ± 0.17 (0.51 – 0.68)	$\leq 0.001^{***}$
28 days	0.39 ± 0.20 (0.30 – 0.48)	0.61 ± 0.20 (0.51 – 0.70)	$\leq 0.001^{***}$

CI: confidence interval; P value: level of significance; SD: standard deviation; NS: Non significant; *: significance at 0.05; ***: significance at 0.001

Table II. Intergroup comparison of calculus index scores (component of oral hygiene index simplified).

Total sample (N=60)	Calculus index simplified Mean ± SD (95% CI)		
	Group 1	Group 2	P value
Base line	0.29 ± 0.31 (0.14 – 0.43)	0.19 ± 0.27 (0.06 – 0.32)	0.30^{NS}
7 days	0.01 ± 0.02 (-0.01 – 0.01)	0.02 ± 0.07 (-0.02 – 0.05)	0.53^{NS}
14 days	0.01 ± 0.03 (-0.004 – 0.02)	0.07 ± 0.13 (0.01 – 0.13)	0.07^{NS}
28 days	0.09 ± 0.13 (0.02 – 0.15)	0.11 ± 0.17 (0.02 – 0.19)	0.69^{NS}

CI: confidence interval; P value: level of significance; SD: standard deviation; NS: Non significant

Table III. Intergroup comparison of oral hygiene index scores (component of oral hygiene index simplified).

Total sample (N=60)	Oral Hygiene index simplified Mean ± SD (95% CI)		
	Group 1	Group 2	P value
Base line	1.02 ± 0.42 (0.82 – 1.21)	1.01 ± 0.48 (0.78 – 1.23)	0.93^{NS}
7 days	0.23 ± 0.21 (0.13 – 0.33)	0.40 ± 0.25 (0.28 – 0.52)	0.02^{*}
14 days	0.31 ± 0.19 (0.22 – 0.39)	0.68 ± 0.27 (0.55 – 0.81)	$\leq 0.001^{***}$
28 days	0.47 ± 0.22 (0.37 – 0.58)	0.71 ± 0.31 (0.57 – 0.86)	$\leq 0.01^{**}$

CI: confidence interval; P value: level of significance; SD: standard deviation; NS: Non significant; *: significance at 0.05; **: significance at 0.01; ***: significance at 0.001

Table IV. Intergroup comparison of oral hygiene index simplified scores and components.

Total sample (N=60)	Group 1 (P value)			Group 2 (P value)		
	DI-S	CI-S	OHI-S	DI-S	CI-S	OHI-S
Base line - 7 days	$\leq 0.001^{***}$	$\leq 0.001^{***}$	$\leq 0.001^{***}$	$\leq 0.001^{***}$	0.004^{**}	$\leq 0.001^{***}$
7 days - 14 days	0.33^{NS}	0.33^{NS}	0.30^{NS}	$\leq 0.001^{***}$	0.07^{NS}	$\leq 0.001^{***}$
14 days - 28 days	0.10^{NS}	0.03^{*}	$\leq 0.01^{**}$	0.75^{NS}	0.05^{*}	0.33^{NS}
Base line - 28 days	$\leq 0.001^{***}$	0.02^{*}	$\leq 0.001^{***}$	0.04^{*}	0.23^{NS}	0.03^{*}

DI-S: Debris index simplified; CI-S: Calculus index simplified; OHI-S: Oral hygiene index simplified ; P value: level of significance; NS: Non significant; *: significance at 0.05; **: significance at 0.01; ***: significance at 0.001

The intragroup comparisons too showed significant reduction in both debris (P≤0.001) and calculus (P=0.02) scores from baseline to 28 days, after the intervention, in group 1, whereas, group 2 showed significant reduction only in debris scores (P=0.04) (Table IV). The effect size of the intervention after 28 days was 1.49 (100% power) in group 1 and 0.55 (99.98%) in group 2.

Discussion

As dental caries is the most prevalent disease in children, there is a crucial requirement to prevent this risk. Dental health education is one of the effective means to achieve this [11]. However, due to unfavorable dentist population ratio in developing countries such as India, dental health education needs other avenues [12]. Pediatric dentists are having the additional advantage of effectively involving parents, teachers, and community health care workers in promoting oral health. Other than dentists, school teachers are the most competent and useful personnel in providing dental education to the children as reported in the literature [12]. This is ascribed to the receptiveness of children to the school teachers. Thus, oral health promotion by the teachers has dual benefits; the education is one to many, and the result of imbibing healthy habits in children will be more productive. Hence, in the present study, school teachers were selected as a means and classroom as an ideal setting for implementing the oral health education program in children. Two branches of a school with similar tuition fee and teaching pattern were selected, to rule out the influence of the confounding factors with possible bias such as socioeconomic status and teaching methodology.

Childhood is the period when the attitudes, behavior, and habits are best established. Tooth brushing is one of the oral health behaviors that should become habitual. There are four stages and transitions in the development of tooth brushing skills in children; Stage 1: Initiation of oral hygiene and entirely dependent tooth brushing in which children ranged in age from 13 to 31 months have little or no motor control, Stage 2: Assisted tooth brushing in which children around age group of 17 months to 5 years old will either 'not brush well' or 'only brush the teeth in the front' with good understanding of the instructions and explanations, Stage 3: Road to tooth brushing independence, children, at 4 to 9 years old, brush their teeth by themselves occasionally without any assistance. Children develop motor control and understand the need to take care of their teeth. Stage 4: Independent tooth brushing in which, children in this stage are capable of brushing their teeth without assistance [13]. Hence, children in the age range of 6 to 7 years were recruited in the present study, as children around this mean age will acquire the skill be to independently brush their teeth. The horizontal scrub technique was imbibed in the composed rhyme, as it is an appropriate method of tooth brushing in young children, considering the development of motor skills [14,15]. The rhyme primarily aims to remind the child to brush all the tooth surfaces.

In the present study, brushing instructions in the form of a rhyme showed a positive impact on the oral hygiene. This can be ascribed to the age appropriate teaching method followed. The importance of private speech, as stated by Lev Semenovich Vygotsky in the theory of cognitive development [16], corresponds to the age group considered in the present study. According to this theory, private speech is the outcome of a developmental process. This is one of the forms to express language, the internal dialogue, in which a person talks to himself or herself. It is the subjective experience of language in the absence of overt and audible articulation, considered as a milestone in the basic oral language development [17]. With time, this talk becomes a whisper, and then the inner private speech. Thus, in children, especially young, the private speech is more likely to be uttered out loud, whereas in adults, it is silent. In children, this talk is used effectively to guide their own behavior by bridging the social and psychological worlds. Children talk to themselves while engaged in a cognitive task, which acts as a tool for learning [16]. This, in turn, assists the child to increase the internal understandings of the external world. Hence, promoting the private speech in young children accelerate the learning process [16,17]. This was proved in the present study, as tooth brushing rhyme, might have encouraged the private speech during tooth brushing, and helped the child to memorize the areas that need to be brushed, successively improving the oral hygiene status in the experimental group.

There are certain drawbacks in the present study. It was implemented only in one private school, due to lack of adequate number of schools with two branches in the target area. As no changes in lifestyle were advocated in the present study, the intervention was not targeted at school children as a complete health promotion scenario. Dental health education was provided only once, without repetition. The long term impact of the intervention also needs to be evaluated. The major limitation of the present study was generalization potential. As the study population were private school children and the rhyme was in the English language, the applicability of the results to the government school children and those who do not know English is questionable. Additional studies on children of low socioeconomic status and influence of rhymes composed in the local language can also project new observations.

Conclusion

Tooth brushing instructions in the form of rhyme has the potency to show a positive impact on the oral hygiene status of children. Hence, further studies can be done on this topic and brushing rhymes recommended in the routine educational curriculum of pre-primary school children.

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