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Research Article

The Relevance between the Oral Hygiene Condition of Preschoolers and the Influence of Oral Health Educational Program Comparing Two Coastal Cities; Port Said (ARE) and Jeddah (KSA)

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Abstract

Objectives: To evaluate the effect of oral health educational program on the oral health knowledge, attitude and practice as well as oral hygiene condition of two groups of preschool children in both Port -Said and Jeddah nurseries (assessed over six months).

Methods: A total number of 340 children (3 - 5.5 years) were included in this study. Children were classified into two main equal groups; Group A: Port Said preschool children (170 children) and Group B: Jeddah preschool children (170 children). A questionnaire and program were designed to measure knowledge, attitude and practice (KAP) for all the children. The dental health education program was conducted in one session only at the beginning of the scholastic year using both posters and videos. Dental Model with a tooth brush was used to teach the children how to brush their teeth. At the end of the program children were given educational coloring mini posters and were prized by tooth pastes and brushes.

Results: No statistical significant difference was found in dental caries indices or oral hygiene index either before or after the program for both groups. There was a significant positive effect of the oral health education program since more children in both Port Said (Group A) and Jeddah (Group B) groups adopted regular oral health behavior such as proper tooth brushing and healthy dietary habits.

Conclusion: The oral health education program is an efficient method for improving the oral health knowledge, attitude and practice of those children.

Keywords: *Oral Health Status; Port Said and Jeddah Preschool Children; Oral Health Educational*

Introduction

Dental caries is one of the most prevalent chronic diseases in mankind worldwide. It is a multifactorial disease that starts with microbiological shifts within the complex biofilm (dental plaque). Caries is affected by the consumption of dietary sugars, salivary flow, exposure to fluoride and preventive behaviors, it is therefore very important to prevent dental caries [1].

According to American Dental Association [2], primary teeth may be temporary, but they deserve good care. They allow proper mastication of food, helping children to maintain sound nutrition. Primary teeth are also important for good pronunciation and speech. Another function of primary teeth is that they guide permanent teeth and contribute to healthy jaw development.

Oral health affects children physically and psychologically and influences how they grow, enjoy life, look, speak, chew, taste food and socialize, as well as their feelings of social well-being. They experience pain, discomfort, disfigurement, acute and chronic infections,

eating and sleep disruption as well as higher risk of hospitalization, high treatment costs and loss of school days with the consequently diminished ability to learn [3]. Health education is any combination of learning experiences designed to facilitate voluntary actions conducive to health. These actions or behaviors may be on the part of individuals, families, institutions or communities. Thus the scope of health education may include educational interventions for children, parents, policy makers, or health care providers. The goal of oral health education is to improve knowledge and attitude which may lead to adoption of favorable oral health behaviors that contribute to better oral health (KAP) [4].

The teaching material consisted mainly of slides, transparencies, posters, banners, videos, study models, information leaflets, specific books and magazines. Taking into account the differences in age and educational level, different techniques were adopted to stimulate participation, such as puppet shows, songs, plays, hand out activity sheets such as word searches and quizzes [5].

Thus, this study aimed to evaluate the effect of oral health educational program on the oral health knowledge, attitude and practice as well as oral hygiene condition of two groups of preschool children in both Port-Said and Jeddah nurseries (assessed over six months).

Subjects and Methods

A total number of 340 children (3 - 5.5 years) were included in this study. Children were classified into two main equal groups; Group A: Port Said preschool children (170 children) and Group B: Jeddah preschool children (170 children). Clinical examination was carried out to assess the child's caries experience following WHO, 1997 criteria for diagnosis [6]. It was conducted in schools' nurseries under natural day light, while the children were sitting on ordinary chair facing a window. Dental examination was carried out using plastic disposable mouth mirror and dental explorer.

A questionnaire and program were designed to measure knowledge, attitude and practice (KAP) for all the children. The questionnaire was read and explained to the children and their teachers and then recorded by the researcher after questioning the children. The dental health education program was based on educating the children the importance, frequency of teeth brushing in addition to the correct dietary habits and the value of healthy food using posters hanged on the walls, videos presented on LCD TV screen.

Dental Model with a tooth brush was used to teach the children how to brush their teeth. At the end of the program children were given educational coloring mini posters and were prized by tooth pastes and brushes to encourage them maintain proper oral hygiene habits and dietary habits.

Qualitative data were presented as frequencies and percentages. McNemar's test and Wilcoxon signed-rank test were used for comparisons between different variables before and after the educational program. Quantitative data were presented as mean and standard deviation values for parametric data (Age data) and non-parametric data (caries indices and OHI-s) were also presented as mean and standard deviation values. Student's t-test was used to compare between age values in the two groups. Wilcoxon signed-rank test was used to study the changes in caries indices and OHI-s after the educational program.

Results

Caries indices

There was no statistically significant difference between mean caries indices in the two groups either before or after the educational program (Table 1).

Group	Caries indices (Mean, SD)	Before program	After program	P- value
(Group A)	dmf	3.5 (3.7)	4.3 (3.9)	0.437
	DMF	0.05 (0.3)	0.2 (0.7)	0.109
	def	4 (4.4)	4.1 (4.6)	0.451
(Group B)	dmf	4.1 (4.6)	4.2 (4.7)	0.949
	DMF	0.1 (0.5)	0.2 (0.7)	0.317
	def	6.2 (4.6)	5.6 (4.7)	0.593

Table 1: *Comparison between caries indices before and after the program.*

**: Significant at P ≤ 0.05*

Oral Hygiene Index (OHI-s)

Before the program, the mean OHI-s for Group A was 0.5, while for Group B it was 0.7.

As regards OHI-s rating; Group A showed lower prevalence of excellent (14.1%), fair oral hygiene (1.8%) and higher prevalence of good oral hygiene (84.1%) than Group B which showed higher prevalence of excellent (14.7%), fair oral hygiene (11.8%) and lower prevalence of good oral hygiene (73.5%).

After the program, there was no statistically significant difference between mean OHI-s in the two groups.

As regards OHI-s rating; Group A showed statistically significant higher prevalence of excellent (18.8%), fair oral hygiene (3.6%) and lower prevalence of good oral hygiene (77.6%). As for Group B, it showed statistically significant higher prevalence of excellent (16%), good oral hygiene (80.7%) and lower prevalence of fair oral hygiene (3.3%), as shown in table 2.

Group		Before program	After program	P-value
Group A	OHI-s Mean (SD)	0.5 (0.4)	0.5 (0.3)	0.607
	OHI rating (n, %)			< 0.001*
	Excellent	24 (14.1%)	32 (18.8%)	
	Good	143 (84.1%)	132 (77.6%)	
	Fair	3 (1.8%)	6 (3.6%)	
Group B	OHI-s Mean (SD)	0.7 (0.5)	0.7 (0.3)	0.052
	OHI rating (n, %)			<0.001*
	Excellent	25 (14.7%)	24 (16%)	
	Good	125 (73.5%)	121 (80.7%)	
	Fair	20 (11.8%)	5 (3.3%)	

Table 2: *Comparison between OHI-s before and after the program.*

**: Significant at P ≤ 0.05*

Dental Health Attitude

Before the program, regarding bleeding gums, Group A showed 0% and 0.6% in Group B. As for previous dental visits, Group A showed lower percentage (19.4%) than Group B (34.7%). As regards dental procedures, Group A showed lower percentage of checkup (9.1%) than Group B (40.7%).

While Group B showed lower percentage of extraction (10.2%) and filling (49.2%) than Group A which showed higher percentage of extraction (24.2%) and filling (63.6%). Regarding importance of teeth, the percentage was 100% in Group A and 98.8% in Group B. As for dealing with carious teeth, the percentage of those who prefer to treat their carious teeth was higher in Group A (92.4%) than Group B (76.5%).

After the program, for both Groups, there was no statistically significant change in the history of previous dental visits and dental procedures. There was a statistically significant increase in cases who would prefer to treat their carious teeth (Table 3).

Group	Dental health attitude (n, %)	Before program	After program	P-value
Group A	Pain complaint	0 (0%)	1(0.5%)	Not computed
	Bleeding gums	0 (0%)	0(0%)	Not computed
	Previous dental visits	33 (19.4%)	28(16.5%)	0.063
	Dental procedures			
	Check up	3 (9.1%)	2 (9.1%)	0.083
	Extraction	8 (24.2%)	7 (24.2%)	
	Filling	21 (63.6%)	19 (63.6%)	
	Extraction and Filling	1 (3%)	0 (0 %)	
	Teeth importance Dealing with carious teeth	170 (100%)	170 (100%)	Not computed
	Treatment	157 (92.4%)	169 (99.4%)	< 0.001*
	Extraction	13 (7.6%)	1 (0.6%)	
Group B	Pain complaint	5 (2.9%)	0 (0%)	Not computed
	Bleeding gums	1 (0.6%)	0 (0%)	Not computed
	Previous dental visits	59 (34.7%)	52 (34.7%)	0.056
	Dental procedures			
	Check up	24 (40.7%)	17 (40.7%)	
	Extraction	6 (10.2%)	6 (10.2%)	
	Filling	29 (49.2%)	28 (49.2%)	0.112
	Extraction and Filling	0 (0%)	0(0%)	
	Teeth importance Dealing with carious teeth	168 (98.8%)	148 (98.7%)	0.045*
	Treatment	130 (76.5%)	146 (97.3%)	<0.001*
	Extraction	40 (24.5%)	4 (2.7%)	

Table 3: *Comparison between dental health attitudes before and after the program*

**: Significant at P ≤ 0.05*

Oral Hygiene Practice

Before the program, tooth brushing percentage for Group A was higher (94.1%) than Group B (93.5%). As regards Group A, brushing frequency percentage (once/day) was 15.6%, (twice/day) was 62.5%, (three times/day) was 21.3% and (four times/day) was 0.6%, while for Group B, brushing frequency percentage (once/day) was 24.5%, (twice/day) was 36.5%, (three times/day) was 30.2% and (four times/day) was 8.8% Regarding brushing method, Group A showed lower percentage of brushing with brush only (13.8%) than Group B (20.8%) and higher percentage of brushing with brush and paste (86.2%) than Group B (79.2%).

After the program, for both Groups, there was a statistically significant increase in cases who brush their teeth. and decrease in cases who brush their teeth once/day and an increase in brushing teeth twice, three and four times/day. Both groups showed the same percentage of brushing using brush and paste 100% (Table 4).

Dietary habits

Before the program, Group A showed higher percentage of eating breakfast, lunch and supper meals (91.2%) than Group B (47.1%).

Regarding type of sandwiches, Group A showed higher percentage of eating cariogenic sandwiches (17.3%) than Group B (9.9). Group A showed higher percentage of eating snacks (95.9%) than Group B (87.7%).

Regarding type of snacks, Group A showed lower percentage of eating cariogenic snacks (30.7%) than Group B (56.4), higher percentage of eating non-cariogenic snacks (55.2%) than Group B (20.1%) and lower percentage of combined snacks (14.1%) than Group B (22.5%).

Regarding fruits and vegetables eating frequencies, Group A showed lower percentage in once/week frequency (8.8%) than Group B (17.5%), higher percentage in twice/week frequency (15.7%) than Group B (7.5%), higher percentage in three times/week frequency (10.7%) than Group B (4.8%) B (0.7%).

Group A also showed higher percentage of 1 cup quantity (54%) than Group B (22.1%). While Group B showed higher percentage of ½ cup quantity (77.9%) than Group A (46%).

After the program, regarding Group A, there was a statistically significant decrease in eating cariogenic sandwiches, decrease in eating cariogenic snacks and combined snacks, and an increase in eating non-cariogenic snacks.

There was also a statistically significant decrease in eating snacks once/day and increase in eating snacks twice/day. There was a statistically significant increase in eating fruits and vegetables. There was a statistically significant increase in eating fruits and vegetables everyday.

While for Group B, there was a statistically significant increase in eating sandwiches and an increase in eating cariogenic sandwiches. There was a statistically significant increase in eating between meals snacks. There was a statistically significant decrease in eating cariogenic snacks, and an increase in eating non-cariogenic and combined snacks.

There was a statistically significant increase in frequency of eating fruits and vegetables three times/week and four times/week. There was also a statistically significant increase in frequency of 1 cup quantity (Table 5).

Group	Dietary habits (n, %)	Before program	After program	P-value
Group A	**Type of meal**			
	Breakfast + lunch + supper	155 (91.2%)	158 (92.9%)	0.250
	Lunch+ supper only	15 (8.8%)	12 (7.1%)	
	Eating sandwiches	168 (98.8%)	168 (98.8%)	1.000
	Type of sandwich			
	Cariogenic	29 (17.3%)	15 (8.9%)	< 0.001*
	Non-cariogenic	139 (82.7%)	153 (91.1%)	
	In-between meals snacks	163 (95.9%)	168 (98.8%)	0.063
	Type of snacks			
	Cariogenic	50 (30.7%)	41 (24.4%)	< 0.001*
	Non-cariogenic	90 (55.2%)	120 (71.4%)	
	Combined	23 (14.1%)	7 (4.2%)	
	Frequency of snacks			
	Once/day	104 (63.8%)	95 (56.5%)	0.002*
	Twice/day	54 (33.1%)	68 (40.5%)	
	Three times/day	5 (3%)	5 (3%)	
	Eating fruits and vegetables	159 (93.5%)	168 (98.8%)	0.004*
	Frequency			
	Once/week	14 (8.8%)	9 (5.3%)	<0.001*
	Twice/week	25 (15.7%)	17 (10%)	
	Three times/week	17 (10.7%)	20 (11.8%)	
	Everyday	103 (64.8%)	122 (72.9%)	
	Quantity			
	½ cup	73 (46%)	68 (41.2%)	0.063
	1 cup	86 (54%)	100 (58.8%)	
Group B	**Type of meal**			
	Breakfast + lunch + supper	80 (47.1%)	81 (54%)	1.000
	Lunch+ supper only	90 (52.9%)	69 (46%)	
	Eating sandwiches	152 (89.4%)	140 (93.3%)	0.002*
	Type of sandwich			
	Cariogenic	15 (9.9%)	22 (15.7%)	<0.001*
	Non-cariogenic	137 (90.1%)	118 (84.3%)	
	In-between meals snacks	149 (87.7%)	139 (92.7%)	0.002*
	Type of snacks			
	Cariogenic	84 (56.4%)	40 (28.8%)	<0.001*
	Non-cariogenic	30 (20.1%)	44 (31.7%)	
	Combined	35 (22.5%)	55 (39.6%)	
	Frequency of snacks			
	Once/day	105 (70.5%)	76 (54.7%)	<0.001*
	Twice/day	34 (22.8%)	55 (39.6%)	
	Three times/day	7 (4.7%)	7 (5%)	
	Four times/day	3 (2%)	1 (0.7%)	
	Eating fruits and vegetables Frequency	149 (87.6%)	145 (96.7%)	0.125
	Once/week	26 (17.5%)	26 (17.9%)	0.012*
	Twice/week	11 (7.5%)	5 (3.4%)	
	Three times/week	7 (4.8%)	14 (9.7%)	
	Four times/week	1 (0.7%)	4 (2.8%)	
	Everyday	104 (69.5%)	96 (66.2%)	
	Quantity			
	½ cup	116 (77.9%)	72 (49.7%)	
	1 cup	33 (22.1%)	73 (50.3%)	< 0.001*

Table 5: *Comparison between dietary habits before and after the program.*

**: Significant at P ≤ 0.05*

Discussion

Oral health is related to well-being and quality of life as measured along functional, psychological and economic dimensions. Diet, nutrition, psychological status, social interaction, school and work are affected by impaired oral and craniofacial health. Reduced oral health is associated with poor clinical status and reduced access to care [7].

Dental health education at all ages is a vital part of all oral hygiene practices. For preschool children the principal objective is to teach and motivate parents and their children to practice oral hygiene to prevent the onset of dental diseases [8].

By searching on current publication, it can be identified that previous studies focusing on school-based oral health education were primarily concerned with the relationship between the oral health status and the pattern of oral health knowledge and behavior in schoolchildren [9-11].

Besides dealing with this relationship, others have assessed the oral health knowledge, attitudes and practices of the schoolchildren's mothers. Moreover, studies including the assessment of the schoolteachers' knowledge and attitudes with regard to oral health education of children were also carried out [12,13].

The current program was planned to educate children the basic skills of tooth brushing and healthy dietary habits, to implement the benefits and importance of good oral hygiene and to evaluate the effect of this program on the oral health of children participating in this study.

The present study was carried out in both Port Said and Jeddah preschools. In this study 340 children were included, their ages ranged from 3 to 5.5 years old. The sample was divided into two equal groups: Group A (Port Said preschoolers) and Group B (Jeddah preschoolers). Coastal cities from two different societies (Port Said in ARE and Jeddah in KSA) were selected, speculating that there might be similarity in the dietary habits, regarding the type of meals and snacks.

Sample Attrition happened at the end of the scholastic year for Group B (Jeddah Group) only, which started with a total number of 170 children (90 boys and 80 girls) and decreased to 150 children (80 boys and 70 girls), this might be attributed to repeated absence of the children. Many visits were attempted to reach those children. Furthermore, some of them were transferred to other preschools and became out of reach.

Educational dental health program was carried out using posters hanged on the wall, in addition to video watching and the effect of this program was evaluated after 6 months. This was similar to other studies conducted by Gad [14]; Mandell [15] and Conrado [16] that used posters and videos in their studies in health education programs.

In this study no statistical significant difference was noted between mean caries indices in the two groups either before or after the program which is in agreement with Gad [14], this may be attributed to the short time interval of the study.

In each group, there was no statistically significant change in OHI-s scores before and after the educational program which is in accordance with Wanjau and Plessis [17], this may be attributed to the fact that the dietary and oral hygiene practices related to dental caries are mostly controlled by parents at this early age and parents were not included in health education program of the current study.

This was in contrast with El Masry and Mortada [18] who found marked improvement in OHI-s scores after 6 months' educational dental health program. This should not be considered directly linked to the educational dental health program adopted as no control group was selected for comparison. This fact may be regarded as one of the limitations of the study.

The results of this study showed no statistical significant change in previous dental visits before and after the program in both groups; 28% in Group A and 52% in Group B this disagreed with the study of Walker [19] for preschool children of Iowa City, U.S.A who reported that 89% of the sample population had visited their dentists for regular check-up. This may be attributed to young age group of the studied children and short-term dental health education program adopted.

In this study there was a statistically significant increase in cases who knew the importance of teeth and those who would prefer to treat their carious teeth rather than to extract. This came in accordance with Khattab [20]. This may be attributed to the positive response to the offered dental health educational program.

The current study showed a statistical significant increase in cases who brush their teeth as well as proper improvement in the brushing method after the program this was in agreement with Petersen., *et a*l. [21] and Farag., *et al*. [22] who found marked improvement in oral hygiene practice, brushing method and frequency after implementation of school based educational oral health program. Unlike Khattab [20] who found that tooth brushing was uncommon among the studied population and referred the reason for that to low socio-economic status of children in the studied sample. This may be due to positive response to the offered educational dental health program.

As regards tooth brushing frequency, there was increase in cases who brush their teeth two times, three times and four times/day after the program. The same finding was reported by Peng., *et al*. [23] in China and Vigild., *et al*. [12] in Kuwait who found that 40% and 54% of the children, respectively, brushed their teeth at least twice/day. On the other hand, these findings disagreed with Micheelis [24] and Edward., *et al*. [25] who found that the highest reported frequency of tooth brushing among the studied children was once/day. This may be due to the positive response of the offered educational dental health program.

The role of diet or more precisely carbohydrates in the etiology of dental caries has been clearly demonstrated in various studies Navia [26]; Jamel., *et al*. [27] and Rug-Gunn [28]. The introduction of diet counselling was found to play an important role in caries preventive programs, Johansson [29]. In the present study a questionnaire was used to evaluate dietary habits of the children and questions used intended to be unleading. The cariogenic potential of the child's food was determined on the basis of several reports and guidelines of food cariogenicity provided by Edgar [30]; Pollard [31] and Rug-Gunn [28].

The current study showed statistically significant increase in cases that eat non-cariogenic sandwiches and snacks at the end of the educational program. Similarly, Petersen., *et al*. [21] found decrease in cases that consume cake and biscuits in snacks after implementation of educational dental health program.

This result was inconsistent with Peng., *et al*. [23] who found increase in cases who eat cariogenic snacks. This may be due the positive impact of the offered educational dental health program. In this study there was statistically significant increase in frequency of eating snacks twice/day. Unlike Kattab [21] who found that the highest frequency of intake of snacks was once/day. It was reported by about 40% of the studied children. This may be due to positive response to the offered educational dental health program. This came in accordance with Al-Banyan., *et al.* [32] who found that about 51% of the children in their had more than twice/day snacks. The result of this study also showed increased intake of fresh fruit and vegetables at the end of the program this was consistent with Kattab [20] who found higher consumption of fresh fruit and vegetables among the studied children. Another finding which is worth mentioning in this study is that there was increase intake of 1 cup quantity of fresh fruit and vegetables over ½ cup quantity. This might be attributed to the positive influence of the offered educational dental health program; the children are more attentive toward proper dietary habits.

By the end of this study, a marked improvement in oral hygiene habits as well as dietary habits was clearly noticed. This may be attributed to the positive response to the offered dental health educational program.

Limitations of this program may be summed in two points; short term assessment of the educational dental program (6 months) and no control group was used for comparison.

Conclusions

1. There was no statistically significant difference between mean caries indices and OHI-s in the two groups either before or after the program.
2. The program was not effective in improving the oral hygiene index of the children.
3. The program was effective in increasing the number children who knew the importance of their teeth and those who would prefer to treat their carious rather than extract them.
4. The program was effective in increasing the number of preschool children who brush their teeth.
5. The program was not effective in improving the frequency of teeth brushing.
6. The program was effective in increasing awareness of preschool children toward eating healthy non-cariogenic sandwiches and snacks.
7. The program was effective in increasing the attitude of children toward eating fruits and vegetables more frequently.

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