Comparison between Conventional Health Promotion and Use of Cartoon Animation in Delivering Oral Health Education

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Abstract

Dental caries is a multi-factorial disease which can be prevented. Oral health education is part of the strategies in preventing dental caries, especially among preschool children. This study was conducted to evaluate the effectiveness and sustainability of cartoon animation as a medium in delivering oral health education. This is an intervention study involving 2 pre-schools which were selected randomly. One school received cartoon animation as a source of oral health education (intervention group) and for the other school; oral health education was given by dental nurses (control group). Oral hygiene knowledge, attitude and practice (KAP) score were assessed using guided questionnaires. Data was analyzed using SPSS version 12 by SPSS Inc. USA. Result shows that there is a statistical difference ($p < 0.05$) in KAP level between the groups and also between times. From this study, it is concluded that cartoon animation as a medium was more effective and sustainable in delivering oral health education messages compared to traditional method.

Keywords: cartoon animation, oral health education, kindergarten

1 Introduction

1.1 Dental Caries

Dental caries is the most common oral disease affecting children more than any other chronic infectious disease (CDC 2007_a, Widström & Eaton 2004). Study shows that dental caries are 5 times more common than asthma and 7 times more common than hay fever, where more than half of children aged 5-9 have had at least one cavity or filling (CDC 2007_b). Despite great achievements in the global oral health of the population (Petersen 2003) caries prevalence is still high. In most industrialized countries, dental caries affects 60-90% of schoolchildren (Petersen 2005). In Malaysia, caries prevalence among 6-year-olds was 80.9% with caries experience (dft) reported was 4.1 (Ministry Of Health Malaysia Survey 1997, MOH 2003). The daily reality for children with untreated oral disease often causes persistent pain, inability to eat comfortably or chew well, embarrassment at discolored and damaged teeth, and distraction from play and learning. It was reported that an estimated 51 million school hours per year are lost due to dental-related illness. In United States alone, students aged 5 to 17 years missed 1,611,000 school days in 1996 due to acute dental problems with an average of 3.1 days per 100 students (NCHS 1996_a). Early tooth loss caused by dental caries is usually associated in failure to thrive, impaired speech development, absence from and inability to concentrate in school, and reduced self-esteem (NCHS 1996_b). In addition, poor oral health has shown to be associated with decreased school performance, poor social relationships, and less success later in life (NIH 2000).

1.2 Health Education

It is well known that dental caries can be prevented. Health education is part of health promotion and disease prevention measures to improve the oral health and well-being of all children (NIDCR 1992). Health education is used as a tool to increase knowledge and awareness that can influence individual attitude and practice towards good oral hygiene. The current practice in Malaysia is that health education is given by trained dental nurses during their pre-school visits.

1.3 Cartoon Animation

Multimedia especially cartoon animation had been explored widely as teaching aids (CDC 2000_a, Williamson and Abraham 1995, Mayer 2001). Study reported that teaching using animation techniques will increase student academic achievement (CDC 2000_b). Moreover, in order to increase understanding of the subject learned, it will be easier if presented in animation form (Collin S 1995). This study aims to explore the effectiveness of cartoon animation as a medium in delivering health education messages among preschool children in Hulu Terengganu District.

Preschool children refer to children aged 5 to 6-years-old attending kindergarten centre. The study was carried out to assess the level of knowledge, attitude and practice (KAP) score after intervention and also the sustainability of newly acquired KAP score level after a few weeks.

2. Objectives and Research Questions

2.1 General objective

To evaluate the effectiveness of multimedia (cartoon animation) as a medium to increase knowledge, attitude and practice toward the important of oral health among pre-school children in Hulu Terengganu District

2.2 Specific objectives

1. To determine the Knowledge, Attitude and practice (KAP) score towards good oral health among pre-school children in Hulu Terengganu District.
2. To assess the effectiveness of cartoon animation as a medium to increase KAP towards good oral health among pre-school children in Hulu Terengganu District.

3 Material and methods

3.1 Study Design, Reference Population, and Source Population

An interventional study starting from 15 October 2008 to 15 December 2008 was carried out in two preschools in Hulu Terengganu District. The two randomly selected preschool were TADIKA KEMAS Kuala Berang and TADIKA KEMAS Jalan Kubor. The reference population for this study includes all preschool children ages 5 to 6-years-old (Reiber LP 1991) in the Hulu Terengganu District of Terengganu. Source populations are dentate preschool children aged 5 to 6-years-old, who attended preschool in Hulu Terengganu, Terengganu during school days. Inclusion criteria are Malaysian citizen and dentate as defined as having at least one natural root or tooth in the mouth (MOH 2004).

3.2 Exclusion Criteria

Children who had been certified by medical practitioners of having systemic illness and also children with long term medication to avoid influence on oral health quality were excluded from this study.

3.3 Sample Size Calculation and Sampling

Sample size was calculated using PS Software® (Dupont and Plummer 1998) (sample size for paired t-test). Difference in KAP score was set at: $\alpha = 0.05$; $\beta = 0.8$; Detectable different (δ) =0.2; Standard deviation (σ) =0.3[18] n = (20 + 10) +10% drop out = 33. The largest sample size calculated after multiplied with 2 and 10% dropout was 66 children. Children were selected by using systematic random sampling. First, two preschool were selected. Then, from these two preschool, 33 children were randomly selected from every school.

3.4 Research Tools

3.4.1 Questionnaire

This study started with a session of interviewer guided questionnaire. A structured questionnaire was used to obtain the socio-demographic characteristics, and also knowledge, attitude and practice score (Badariah TC 2005).

3.4.2 Cartoon Animation

Cartoon animation was developed focusing on three core message (the importance of tooth brushing, diet, and tooth brushing technique). This animation was developed after focus group discussion had been conducted (tailoring on content, character and presentation) and also from expert opinion. In the intervention group, oral health talk and oral hygiene instruction was given by staff nurses followed by the showing of cartoon animation every morning for five days. In the control group, they were only given oral health talk and oral hygiene instruction by staff nurses.

3.5 Data Collection

Data collection was done in the schools by one researcher. One examiner was involved throughout the study to reduce inter-variability and no duplicate measurements were made for checking the reliability of measurements. The data was collected before intervention, after one week of intervention and after two weeks of intervention.

3.6 Data Analysis

All data entering and analysis was done using SPSS12.0 (SPSS Inc.). For descriptive statistics means and standard deviation (SD) was calculated for continuous variables. To assess KAP score between groups, between time and the difference in group time effect, repeated measure ANOVA was used with the level of significance was set at 0.05.

3.7 Registration

Permission from school authorities and informed consent from parents had been obtained prior to intervention. This study was registered under USIM research code PPP/FPg-02-20609 and also registered under NMRR ID number 2880.

4 Results

4.1 Descriptive

Table 1: Descriptive statistic (n=66)

	Group	**Mean (SD)**
Baseline KAP score	Control	114.21 (12.173)
	Intervention	114.67 (15.431)
1 week after intervention	Control	120.18 (10.611)
	Intervention	121.85 (10.069)
2 weeks after intervention	Control	115.67 (10.319)
	Intervention	127.09 (11.254)

4.2 Repeated Measure ANOVA

Table 2: Mauchly's Test of Sphericity

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon(a)		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
time	.947	3.437	2	.179	.950	.993	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

Table 3: Levene's Test of Equality of Error Variances (n=66)

	F	df1	df2	Sig.
baseline KAP score	2.924	1	64	.092
After 1 week	.154	1	64	.696
After 2 weeks	.186	1	64	.668

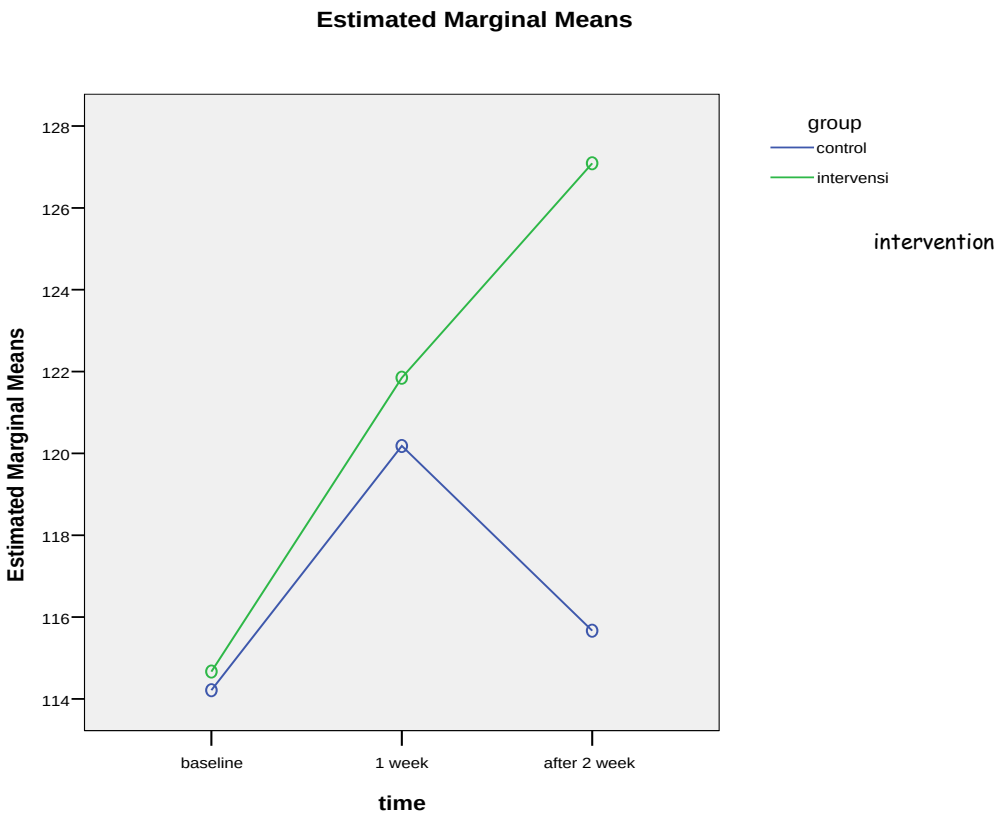
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

Table 4: Crude and adjusted mean scores of 2 study samples in pre- to post 1 and post 2-intervention stages (n=66)

		Mean (SD)			**Adjusted mean[a] (95% CI)**			**F-stat (df)**	**p-value**
	Group	***Pre-1***	***Post-1***	***Post-2***	***Pre-1***	***Post-1***	***Post-2***		
KAP Score	**Interv.**	114.67 (15.431)	121.85 (10.069)	127.09 (11.254)	114.67 (109.83;119.50)	121.848 (118.25;125.45)	127.09 (123.33;130.84)	14.588 (64)	<0.001
	control	114.21 (12.173)	120.18 (10.611)	115.67 (10.319)	114.21 (109.38;119.04)	120.182 (116.58;123.78)	115.67 (111.91;119.42)		

[a] Adjusted for mean KAP score

Figure 1: Graph of KAP score vs. time



From Table 1, the level of knowledge, attitude and practice (KAP) scores between the two groups were similar. There is marked increase in KAP scores in both groups after oral health education was given. However, the score declined after that in the control group, but it was sustained in the intervention group. Results of compound symmetry and equal variance in Table 2 and Table 3 were not significant, which enabled us to proceed with repeated measure ANOVA to compare group effect, time effect and group time effect to measure the differences in KAP score between these two groups. Table 4 shows that there is significant differences in level of knowledge score between control and intervention group (p-value <0.001). The differences were further illustrated in Figure 1.

5 Discussions

From this study, the conventional oral health education that had been practiced currently is still effective in delivering oral health education. Dental nurse visits at regular intervals do have benefit in giving knowledge and create awareness among preschool children towards good oral hygiene practice. However, there is lack of sustainability of the awareness the children get. Previously, no measure had been taken to assess the effectiveness of oral health education in Hulu Terengganu district. The indicators available were percentage of caries free among 6-year-olds, caries experience (dft) and percentage of preschool coverage by dental nurse. This entire indicator had been used as a proxy to oral health education activity. Direct measure of KAP on effectiveness of oral health education is impossible since there is lack of homogeneity and non-standardized method of delivery, message contents, and technique of delivery, calibration issues and others. In this study, cartoon animation in audio video format gives the opportunity to minimize and control the possible confounders that can be present. By supplying the oral health education in compact disc format, it is possible to standardize the procedure of delivery in written instruction.

Result from this study shows that cartoon animation can increase the level of KAP score more than the conventional method. The ability to absorb information among children of aged group 5 to 6-years-old is hugely influenced by the medium that had been used. Studies show that multimedia or cartoon animation will help in the teaching learning process of children more effectively (Collin S 1995$_{b,}$ Jamalludin H and Zaidatun T 2003$_{a}$, Ellis 2004$_{a}$). This medium enable integration and manipulation of messages into video, audio, graphic, text and animation which will attract children's attention significantly (Dick W and Carey L 1978, Dick W. and Reiser RA 1989$_{a}$, Gagne RM 1985).

Animation was the most practical and rational method to draw children attention during teaching process (Baek T and Layne B1988$_a$). The impact was highly significant among slow learning children. Findings from this study show that the level of KAP among the intervention group was higher then the control group. It shows that cartoon animation as a medium can increase children's acceptance towards messages that were delivered. The same findings had also been reported by other studies (Dick W. and Reiser RA 1989$_a$, Ellis 2004$_b$, Baek T and Layne B1988$_b$). In addition, teaching using animation technique will increase children's knowledge (CDC 2000$_c$). It was reported that use of animation technique will enable more complex concept to be delivered more easily so that it can be easily understood and easy to be remembered (Ellis 2004$_c$). Besides that, cartoon animation can make the teaching learning process become more fun and enjoyable (Jamalludin H and Zaidatun T 2003$_c$). Teaching need to be in the form so that the children understand what they learn effectively (Reiber LP 1991). It is easier if it can be illustrated in graphic form and moving as in animation. This finding is also supported in another study (CDC 2000b).

This technique will also increase the children's school achievement (Williamson VM and Abraham MR 1995$_b$). Children's acceptance to messages can be due to the attention they give during teaching-learning sessions. Children will be more focused and concentrate on the character, movement, characteristic, colour and interesting story being presented. The story and character were tools to attract the attention of most children (Ellis T 2004$_d$). As a result, the learning process becomes more interesting and fun and the messages can be easily delivered (Collin S1995$_c$). Children's attitude toward good oral health can be changed if they get and understand the messages clearly. How the changing process happens is very subjective and is still not clear. According to cognitive theory (Alessi SM and Trollip SR 2001), education is a learning process which will enhance interpretation of good sensation. This sensation will influence perception aspect that will help individuals to make decisions (Zheng et al 2007). In this study, it refers to the attitude towards good oral hygiene practice. Children can make decisions in changing their attitude towards good oral health if they can concentrate, understand and interpret the messages they get. This attitude is further strengthened if it is self developed (Vygotsky LS1962$_a$).

In Social Development Theory, it was explained that children will reach at a level where they can do something without help from anybody if they can interpret the knowledge they learned (Vygotsky LS1962$_b$). The ability of children to understand the contents of messages will trigger their changing attitude. In order to do that, they must know and understand from the message they get. Studies show that children gain more understanding from messages they learn in story form (Baggett P 1984, Kozma, R. B. (1991). Children will learn faster and easier from messages they got from the interesting cartoon that they watch. Interesting stories will assist children in making decisions and conclusions from what they had watched (Lave J 1996). The same approach had been used in this study. In addition, children's attitude and practice can also be influenced by the story they watch. In this study, the characters had been built as close as possible to the children's environment, interest and daily activities. It must be in the real world context, where there are social relationships, tools and engaging experience that make the best learning environment (Basow SA and Howe KG 1980). Furthermore, it was reported that learning is also shaped by the context, culture, and also tool being used in the learning situation. Therefore it should be closed and convenient to the target audience especially the cultural aspect.

Children adore their superheroes. They need champions to emulate. Studies among school children show that children tend to make their heroes as their idols and try to become like them, for example their characters, personal appearances, styles. The advantage of multimedia cartoon animation is that it can be manipulated so that many messages can be delivered through this superhero character. Therefore, choosing the right character to deliver the messages is important[30]. This feature had been explored in this study. The cartoon character was used to teach children on how to brush their teeth correctly, influence them to practice tooth brushing daily and other messages. In addition, oral hygiene practice was made more fun and interesting in this study as they practice it while dancing and singing following the cartoon character they were watching. Thus it will change their attitude towards practicing good oral hygiene habits.

6 Conclusion and Recommendation

From this study it is concluded that cartoon animation enhances oral health education delivery to preschool children in Hulu Terengganu District ($P < 0.05$). The duty of giving oral health education can be shared with other community members. Preschool teachers can play a major role by playing the oral health education in compact disc format everyday in their classes. By doing so, it will increase sustainability of information given and standardization of information given can be made.

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