The Effect of Dental Health Education and the Total Quality Management Approach on the Behavior of Dental and Oral Health Maintenance and the Status of the Oral Hygiene Index Simplified in Elementary School Students in Aceh Besar

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Abstract

BACKGROUND: Overall body health is influenced a lot by teeth and mouth. Dental health education in schools through total quality management (TQM) is a non-formal education system for school communities by learning by doing to change their behavior from being less profitable to be beneficial for their oral health.

AIM: This study aims to analyze the effect of dental health education with a TQM approach on the behavior of dental and oral health management, and the status of the oral hygiene index simplified (OHIS) in elementary school students.

MATERIALS AND METHODS: The design of that project was a quasi-experimental design with a pre-post-test design with a control group design. The number of study population was 80 children that were selected. The sample was divided into two groups, the intervention group consisted of 40 children who were given intervention (dental health education with TQM approach) and the control group consisted of 40 children who were not given intervention. Data analysis used univariable, bivariable, and multivariate using paired samples t-test and independent t-test.

RESULTS: The statistical findings showed that there were differences in behavior and oral hygiene status after dental health education through the TQM approach to students (p < 0.05). There was an effect of dental health education through the TQM approach on OHIS status (p <0.05). Dental health education using the TQM approach influenced changes in behavior and OHI-S status (p = 0.001). The finding of the analysis showed that in the intervention group, there were differences in the average behavior and oral hygiene status from pre-test to post-test I (p = 0.001). However, there was no difference between post 1 and post-test II (p = 1.00). In the intervention group, there was a difference in this status from pre-test to post-test 1 (p = 0.001). While in the control group, there was no difference in the average behavior from pre-test to post-test I and from post-test I to post-test II. There was a difference in the mean OHIS status from pre-test to post-test 1 and from post-test 1 to post-test 2 in the intervention group and the control group (p < 0.05).

CONCLUSION: Dental health education using the TQM approach has influenced changes in behavior and OHIS status of elementary school students in central Aceh districts.

Introduction

Oral health can affect the quality of life for individuals, families, and communities [1]. Oral health and its relationship to healthy life are a multidimensional concept that includes systemic functions as well as mental and economic health [2]. Dental caries is one of the most common infectious diseases affecting all races, ages, genders, and geographic areas [3]. According to available statistics, the prevalence of dental caries among Iranian students aged 12 years is higher than the global average and, if it was left untreated, can lead to tooth loss [4]. Various factors have been identified that causes decay in children that include poor oral hygiene and nutritional status in children as well as levels of knowledge, habits, attitudes, and self-efficacy regarding oral health among school teachers and parents [5]. They are considering the critical role of teeth from various perspectives that efforts to prevent dental caries, gum disease, and tooth loss must be made. The World Health Organization recommends that every country have a regular oral health program to check oral health status every 5 years [6]. In most health-care systems, various quality improvement initiatives have been implemented to improve health-care management in general and dental health care in particular [7]. The health facilities such as hospitals and health centers as well as clinics or medical centers provide various services such as examinations, treatments, pharmacy, and laboratories. Quality management aims to continue to improve health services through quality planning, quality control, quality assurance, and quality improvement [8]. Integrated quality management is expected to help overcome various changes such as advances in technology and medical information

systems, service systems, health plans, partnerships, alliances, and a better understanding of patients related to service quality [9]. Total quality management (TQM) is a management process through organizational behavior or culture. The TQM approach can only be achieved by paying attention to the characteristics of TQM, namely, focusing on customers/communities, obsession with quality, scientific approach, long-term commitment, teamwork, continuous system improvement, controlled freedom, unity of purpose, community involvement and empowerment, and organizing education and training. Dental health education in schools through TQM is a non-formal education system for school communities by learning by doing to change their behavior from being less profitable to be beneficial for their oral health. The goal of dental health education in schools through TQM is to change the behavior toward dental and oral health of the school community and their families from being less profitable to be beneficial for their oral health. Schools can provide a participatory and supportive environment to involve teachers and parents in the process of promoting oral health in children [10]. The results from the 2013 Basic Health Research showed that the Indonesian population had oral and dental problems by 25.9%. It has been identified that 62.9% of the population in Aceh Province has caries, and generally, people brush their teeth every day in the morning shower and evening bath as much as 90.7%. The proportion of people who brush their teeth every day after breakfast is only 12.6% and before sleep only 20.7%. According to the results of dental and oral examinations for the 6–14 years age group in Aceh Besar District during the UKGS activity, it was shown that 34% of children had caries. The health condition of teeth and mouth in Aceh Besar District showed that the health status of teeth and mouth was a cause for concern. Based on the researcher interview with the school, it was found that the elementary school had never done dental health education through a TQM approach. The TQM approach was carried out by involving the school community, teachers, parents, and students. Based on the above background, the purpose of this study is to analyze the effect of dental education health through a TQM approach to understand the changes in dental and oral health maintenance behavior and oral hygiene index simplified (OHIS) status among students of SDN Lamsayuen, Aceh Besar District.

Materials and Methods

That type of quasi-experimental research or quasi-experimental design with pre-test research design and post-test group design was chosen. That research was conducted at Elementary School Students, Lamsayuen, Aceh Besar District. The population in this study were the principal, teachers, parents of students (mother), and all students in Grades V and VI SD Negeri Lamsayuen, Aceh Besar District, totaling 80 children. The sample in this study were the principal, teachers, and students in Grades V and VI, totaling 80 students, then divided into two groups, the intervention group consisting of 40 children was given intervention (dental health education with a TQM approach) and the control group consisted of 40 children who were not given intervention. Students were divided into two groups, namely: (1) The treatment group (I) was 20 students of class Va and 20 students of class VIb, a total of 40 students were given dental health education through a TQM approach. (2) The control group (II) was 20 students in class Vb and 20 students in class VIa, totaling 40 students, who were not given intervention. Analysis of the results of this study using: (1) Paired samples t-test, which is to determine the differences in behavior improvement and oral hygiene status in the treatment group, namely, from pre-test to post-test I, post-test I to post-test II, and from pre-test to post-test II. (2) The independent t-test is to determine the difference in the increase in the treatment group. (3) Manova test was used to determine the effect of an intervention on maintenance behavior variables and dental and oral hygiene status. The data analysis used the Statistical Package for the Social Sciences program, with hypothesis testing based on a significant level of $p < 0.00$.

Results

Univariate analysis

The univariate analysis in this study included changes in behavior and oral hygiene status OHIS before treatment (pre-test) and after treatment (post-test I and post-test II). The behavior in this study was measured using a questionnaire instrument. Meanwhile, dental and oral hygiene status data were carried out through a clinical examination of the students' oral hygiene status using the OHI-S index. The results of the univariate analysis are collected in Table 1.

Based on Table 1, the behavior results in the intervention group and the control group are in a low category (82.5%) and the excellent category (17.5%).

Table 1: Distribution of respondents based on behavior, and dental and oral hygiene status in Groups I and II before intervention

Pre-test	Group I		Group II	
Status	n	%	n	%
Good	7	17.5	7	17.5
Not good	33	82.5	33	82.5
Total	40	100	40	100
OHI-S status				
Good	0	0	0	0
Moderate	11	27.5	12	30
Bad	29	72.5	28	70
Total	40	100	40	100

OHIS: Oral hygiene index simplified.

Meanwhile, the oral hygiene status of respondents in the intervention group mostly had a lousy category of dental and oral hygiene (72.5%), while in the control group, most of them were also in the wrong category (72.5%).

Based on Table 2, the results of behavior in the intervention group were partly in the excellent category 87%, while in the control group are in a low category of 75%. The oral hygiene status of respondents in the intervention group was in the wrong category of oral hygiene (17.5%), while the control group was in the wrong category (75%).

Table 2: Distribution of respondents based on behavior, and dental and oral hygiene status in Groups I and II has been treated

Post-test	Group I		Group II	
Status	n	%	n	%
Good	35	87.5	10	25
Not good	5	12.5	30	75
Total	40	100	40	100
OHI-S status				
Good	9	22.5	0	0
Moderate	24	60	10	25
Bad	7	17.5	30	75
Total	40	100	40	100

OHIS: Oral hygiene index simplified.

Testing prerequisite analysis

Analysis of the data in this study using parametric statistical techniques t-test (paired t-test), t-test (independent t-test), and test Manova. The data normality test in this study used the Kolmogorov–Smirnov Z test and the F test (Levene's test for equality of variances). The results of the normality and homogeneity tests are as follows:

Table 3 shows that the test results with the Kolmogorov–Smirnov Z test, and the Levene's test on equality of variances, all of the significance are at the 5% significance level ($p > 0.05$), which means that the data in this study are typically distributed and homogeneous.

Table 3: Results of normality and homogeneity test results of data in Group I and Group II

Variable data distribution	Kolmogorov–Smirnov		Conclusion
	Z	p (sign.)	
Behavior	1.351	0.084	Normal
OHI-S status	1.19	0.118	Normal
	Levene's test for equality of variance		
	F. Hit	p (Sign.)	
Behavior	0.236	0.758	Homogen
OHI-S status	1.412	0.364	Homogen

OHIS: Oral hygiene index simplified.

Analysis (paired sample t-test)

The results of the analysis of the average increase in behavior, dental and oral hygiene status through pre-test to post-test I, from post-test I to post-test II, and from pre-test to post-test II in treatment Groups I and II.

Table 4 shows in the intervention group, there are differences in the average behavior of a pre-test to post-test I ($p = 0.001$). There was no difference from post 1 to post-test II ($p = 1.00$). In the intervention group, there was a difference in this status from pre-test to post-test 1 ($p = 0.001$). Where in the control group, there was no difference in the average behavior from pre-test to post-test I and from post-test I to post-test II. There was a difference mean of status from pre-test to post-test one and from post-test 1 to post-test 2 ($p < 0.05$) in the intervention group and the control group.

Table 4: Average of students' teeth and oral hygiene behavior and status from pre-test to post-test I, and from post-test I to post-test II, in the treatment group and the control group

Behavior	Group I			Group I		
	Average ± SD	CI	p	Average ± SD	CI	p
Pre-test Post-test 1	2.90 ± 2.44	3.68–2.11	0.001*	0.25 ± 0.27	0.11–0.06	0.5
Post-test 1 Post-test 2	0.00 ± 0.22	0.07–0.07	1.00	0.50 ± 0.22	0.12–0.02	0.16
OHIS status						
Pre-test Post-test 1	0.90 ± 0.48	0.74–1.05	0.001*	0.06 ± 0.13	0.10–0.01	0.006*
Post-test 1 Post-test 2	0.14 ± 0.14	0.09–0.19	0.001*	0.15 ± 0.11	0.18–0.11	0.001*

OHIS: Oral hygiene index simplified.

Analysis (independent t-test)

Based on Table 5, it shows that there are differences in behavior and oral hygiene status after dental health education through the TQM approach in students ($p < 0.05$).

Table 5: Teeth and oral hygiene behavior and status before and after being given dental health education through the TQM approach

Parameters	Mean different	CI	p
Education-behavior	1.87	2.38–1.36	0.001*
Education-OHIS status	0.56	0.33–0.78	0.001*

OHIS: Oral hygiene index simplified; Note: * = significant.

Discussion

The function of the teeth is as a food chewing tool, helping to crush food in the mouth to help the human general health digestive organs so the body can absorb that food. The source of oral and dental diseases in children is due to the negligence of oral hygiene, resulting in plaque accumulation. Oral health is the basis of health, quality of life and is influenced by changing individual understanding, perceptions, expectations, and the ability to adapt to circumstances [11]. The results show that there were differences in behavior and dental and oral hygiene status after dental health education through the TQM approach to students ($p < 0.05$). Dental health education that is given through the TQM approach can be realized in its actions so that it can affect the status of dental and oral hygiene. Statistically, dental health education with

a TQM approach affects changes in behavior and OHIS status. The results of statistical tests showed that there was an effect of dental health education through a TQM approach on changes in student behavior, p = 0.001. There is an effect of dental health education through a TQM approach to OHI-S, p = 0.01. These findings were similar to the previous studies which concluded that implementing school health promotion programs can reduce various health problems such as smoking, low fruit, and water consumption, and bad oral health behaviors among students [12]. Trained teachers and parents play an important role in encouraging students to adopt a healthy, sustainable lifestyle for good oral health [13]. Although the oral health behavior of teachers and parents, as role models, can affect children's dental health and dental caries, it has been shown that many of these role models have limited knowledge and awareness about oral health [14]. Therefore, those groups need training and schools are ideal places that can provide a participatory environment to work on promoting children's oral health. Overall, there is limited evidence regarding the effectiveness of quality management programs in any area of health care [15]. Studies on the effectiveness of quality management programs for a dental practice can make an important contribution to the evidence base regarding quality in oral health services as well as to improve patient outcomes [16]. Continuous quality improvement is an important part of a quality management program for health-care services, which includes general medical practice and dental practice in the primary sector [17]. There is an effect of dental health education through the TQM approach on OHIS status (p < 0.05). Dental health education using the TQM approach influenced changes in behavior and OHI-S status (p = 0.001). Another study in children with special needs also concluded that oral health education could be effectively used to improve children's oral hygiene [18]. Oral health guidelines, including good dental hygiene and eating habits, can thus be an effective intervention aid for teaching basic oral health concepts among schoolchildren [19]. The results of the same study also show differences in patient satisfaction with communication according to experience and gender of dentists [20]. The results showed that in the intervention group, there were differences in the average behavior from pre-test to post-test I (p = 0.001). There was no difference between post 1 and post-test II (p = 1.00). The control group before and after the intervention was differences in behavior which was given with a value of p = 0.001.

Conclusion

There is an effect of dental health education through the TQM approach on OHIS status (p < 0.05). Dental health education using the TQM approach

influenced changes in behavior and OHI-S status (p = 0.001). Dental health education using the TQM approach has influenced changes in behavior and OHIS status of elementary school students in Aceh Besar districts.

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