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Impact of a family dental nursing care home visit model on dental behavior and dental health status in Banda Aceh City, Indonesia

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Abstract

Dental health is an important part of overall health. Many individuals still face challenges in maintaining their oral health. In Indonesia, the prevalence of dental diseases including dental caries and gingivitis remains relatively high, particularly in underserved areas like Banda Aceh City. This study evaluates the impact of the family dental nursing care home visit model on dental behavior and health status in the Baiturrahman District of Banda Aceh City. The research divided participants into intervention and control groups using a quasi-experimental design with pre- and post-test control groups. The findings demonstrated the effectiveness of the home visit model conducted in the Baiturrahman sub-district. Significant improvements were noted in various aspects of oral health. The knowledge of oral health among participants increased by an average of 5.639 ± 3.204 points. Attitudes toward dental care improved as well with an increase of 5.115 ± 4.673 points. Practical dental hygiene behaviors also saw a notable enhancement with a rise of 5.902 ± 2.942 points. Additionally, there was a significant reduction in the oral hygiene index by 2.4672 ± 0.9919 and the plaque index decreased by 21.492 ± 12.793. The prevalence of gingivitis dropped by 1.2541 ± 0.7133 indicating better gum health alongside an overall improvement in dental caries status. These results suggest that family dental nursing care through home visits serves as an effective and constructive model for enhancing dental health behaviors.

Keywords: Community oral health, Dental behavior, Dental health status, Family dental nursing care, Home visit model.

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Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
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1. Introduction

Oral health problems have become one of the most common phenomena and public health problems worldwide. The most common oral disease worldwide is dental caries based on studies conducted by the World Health Organisation (WHO) [1-3]. Various studies worldwide have summarised that dental caries has become a dental health problem with prevalence rates reaching 60-90% in children and also occurring in 100% of adults [4-7]. Based on data from various studies, it is known that periodontal disease is currently also a significant dental health problem with a global prevalence of 15-20% in adults aged 35-44 years. Periodontal disease and dental caries generally interfere with the masticatory system, cause focal infections and affect health [8-10]. Indonesia is one of the countries in the ASEAN region that is also affected by oral health problems such as dental caries (tooth decay). Data from the 2018 Basic Health Survey (Riskesdas) showed that the prevalence of active dental caries in the Indonesian population aged 12 years and older was 93.8% while it was 72.6% in children aged 5 years and 72.3% in children aged 12 years. All provinces in Indonesia have dental caries cases but the provinces with the highest prevalence of active caries are West Java (93.6%), Central Sulawesi (92.5%), and East Nusa Tenggara (92.2%). Based on the 2018 Riskesdas report data, only 10.2% of the Indonesian population visited a dentist in the past year. From this report, it was identified that among the general public, there is still a low awareness of oral health care. In dental care, promotion and education measures are important in the community. These efforts have not reached the target due to limited access, facilities, skilled personnel and other resources. Strategic and innovative measures are needed to increase awareness and encourage better dental health practices in the community [11-14]. One of the programmes that has been carried out is home visits by dental therapists. This program is a home visiting model and is a leading strategy for providing oral health education, screening and interventions directly to families. The advantages of this program are that it is more personal and interactive in an effort to increase knowledge, change behaviour and improve the oral health status of families. In various provinces and districts in Indonesia, the family home visiting model was introduced and socialized as an effort to increase awareness and promote behaviour change [15]. Home visiting approach where dental therapists visit the home to conduct specialized examinations, offer clinical solutions, and provide clinical information as needed. However, the home visiting approach still has obstacles. These obstacles must be identified to determine effectiveness which requires further research. In Baituraman District, Banda Aceh City and oral health problems are very serious affecting the lives of residents. Access to oral health services is low in this region and rates oral diseases are high, especially among poor families. Traditional approaches to oral health education are passive and fail to reach individuals and families at the more personal and interactive level needed to drive behavior change. The home visit model where a dentist comes directly to your home can be an effective solution. The purpose of this study was to evaluate the effectiveness of the home visit model in influencing the oral health care behavior and oral health status of families in Baiturrahman District, Banda Aceh City.

2. Literature Review

Dental and oral health care for the family is an effective approach to improving an individual's overall health in a holistic manner. This approach is based on the concept of dental hygiene care which emphasizes promotive and preventive efforts to achieve independent health behavior change in oral and dental health for clients, whether individuals, families or communities. The family's role in maintaining health is of utmost importance. The family functions to maintain the healthy state of its members enabling them to remain productive and carry out their daily activities optimally. The family's health-related tasks include several aspects such as maintaining healthy behaviors, preventing family members from becoming ill and recognizing and meeting the family's health needs. Dental and oral health is an essential part of family health that should not be overlooked without good dental and oral health. All aspects of life will be disrupted and can drain family resources and finances. Maintaining dental and oral health within the family must be based on adequate knowledge. Good knowledge of family dental health will promote family member satisfaction and prevent dental and oral health problems [16]. Family dental nursing care (home visit services) can play a role in motivating and encouraging family members, especially parents to develop the habit of maintaining dental and oral health in children. This effort can be made by inviting children to brush their teeth regularly determining the frequency of brushing twice a day, and reminding them of the proper brushing times. Additionally, parents can teach the importance of reducing the intake of sweet and sugary foods to prevent dental and oral diseases in children [17].

Studies show that families have important implications in implementing and motivating dental health from an early age. Families have an important role in dental nursing care [18]. In the family, the tendency of the head of the family will teach children to brush their teeth regularly twice a day and remind them of the right schedule for brushing their teeth [19]. Several studies comprehensively link parental education level as an important factor affecting the incidence of caries in children. Parents who have experience and high education tend to bring their children to check their teeth regularly [20]. The opposite situation in low socioeconomic status families. These conditions are often less aware and do not have time for proper dental care [21]. In many cases, appropriate dental care interventions are needed to change behaviour and increase awareness [22].

3. Methods

This study uses an experimental design with a randomized controlled trial (RCT) method. The study is planned to be conducted from January to March 2024 in the Baiturrahman District of Banda Aceh. The research subjects are randomly divided into the following two groups: the intervention group that receives the family dental nursing care model and the control group that only receives standard education. The study uses double-blinding to avoid bias. Subject selection uses

previously established inclusion and exclusion criteria. Pre-test, post-test I, and post-test II data from both groups will be statistically analyzed to assess the effectiveness and side effects of the intervention.

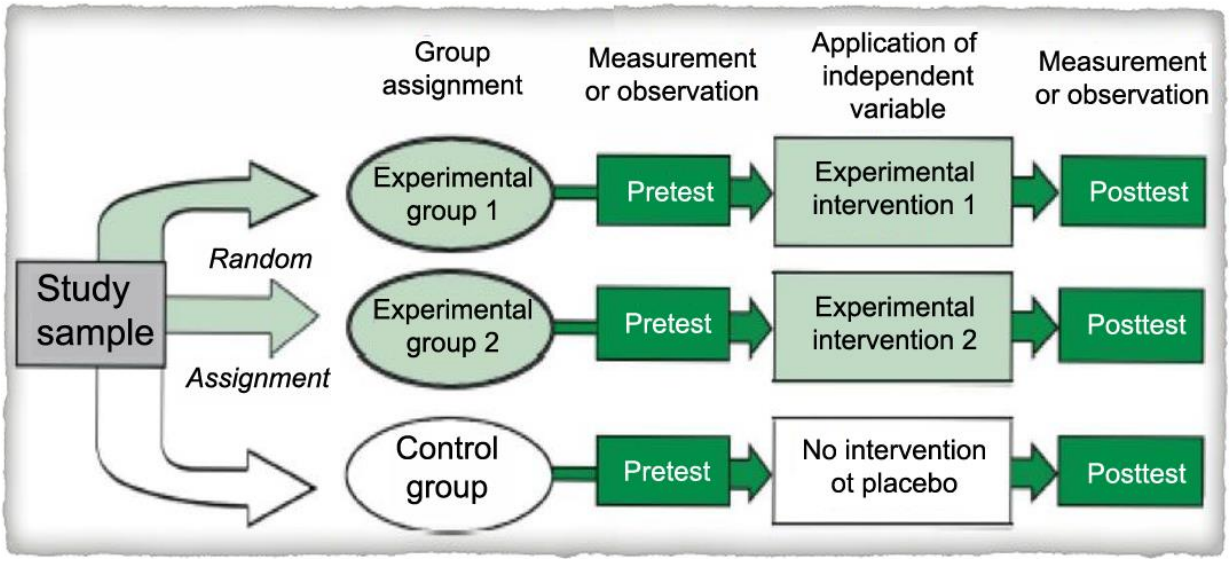

Figure 1.
Pre-and post-test multigroup group design.

Figure 1 illustrates the pre- and post-tests multigroup design which is a type of experimental design widely used in research to evaluate the effects of an intervention. The primary objective of this design is to determine whether the intervention can produce significant changes in the measured variables. The pre-and post-test design is a research methodology that compares results measured before the intervention (pre-test) after the intervention has been implemented (post-test). In this context, researchers can observe the differences between two distinct time points allowing them to conclude the effects of the intervention. The pre-and post-test multigroup design involves several groups of participants, each receiving different treatments. Results for each group are measured both before and after the intervention, enabling researchers to compare not only changes within a single group but also across various groups. This provides a more comprehensive understanding of the effectiveness of the intervention. Pre- and post-test multigroup design is an experimental research design used to evaluate the effects of a specific treatment on multiple groups. In this design, the researcher divides participants into two or more distinct groups. Each group is then administered a pre-test to measure relevant variables before the treatment is applied. The population for this study consists of all families in the Baiturrahman District of Banda Aceh City. The sample employs a case-control method with 61 households designated as the case group (receiving the intervention) and 61 as the control group (not receiving the intervention). This study utilizes a combination of primary and secondary data. Primary data is collected directly from respondents through questionnaires designed to assess mothers' knowledge, attitudes, and practices regarding the maintenance of their children's dental hygiene. Additionally, observations are conducted to evaluate caries status, dental cleanliness, gingivitis, availability of facilities and infrastructure, and family habits. Secondary data is gathered from preliminary studies and reports from relevant agencies to complement and support the primary data. Bivariate analysis is performed to test the hypothesis. The data undergo normality testing using the Shapiro-Wilk test to determine its distribution before conducting the hypothesis tests. If the data is normally distributed, parametric statistics such as the paired sample t- test and independent sample t-test employed. Conversely, if the data is not normally distributed, non-parametric statistics including the Wilcoxon Sign-Rank test and Mann Whitney test are utilized.

4. Results

4.1. General Overview of the Research Locations

Ateuk Pahawan Village and Peuniti Village are villages in the Baiturrahman District of Banda Aceh City. Ateuk Pahlawan village consists of five sub-villages, namely Surabaya sub-village , Teladan sub-village, Labui sub-village, Pahlawan sub-village, and sub-village. Meanwhile, Peuniti village consists of five sub-villages, namely Fakinah sub-village , Malahayati sub-village, Cut Meutia sub-village, Ratu Safiatuddin sub-village, and Cut Nyak Dhien sub-village.

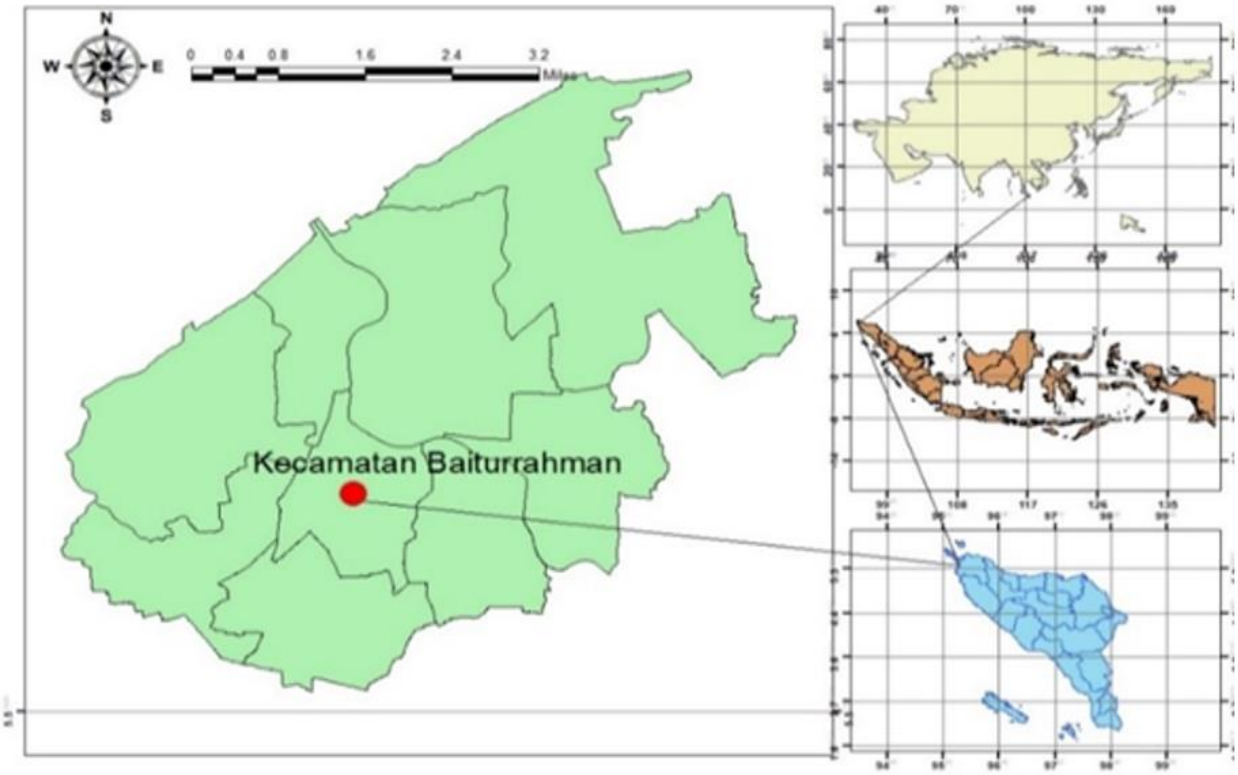

Figure 2.
Map of the research location showing the Baiturrahman District, Banda Aceh City.

Figure 2 presents a detailed map of the research location, specifically highlighting the Baiturrahman District in Banda Aceh City. In the context of the study, the map serves as a visual representation of the area providing context by illustrating key geographic features, boundaries, and significant landmarks within the district.

Table 1.
Frequency distribution of family characteristics in the intervention group and control group.

Characteristics	Intervention group		Control group	
	n	%	n	%
Children				
Age				
a. 0-16 years	111	71.1	109	71.2
b. 17-25 years	45	28.9	44	28.8
Gender				
a. Male	84	53.8	79	51.6
b. Female	72	46.2	74	48.4
Education				
a. Bachelor's degree	3	1.9	8	5.3
b. High school and vocational school	40	25.6	36	23.5
c. Junior high, elementary and preschool	113	72.4	109	71.2
Father				
Age				
a. 26 - 35 years	2	3.3	14	23.0
b. 36 - 45 years	24	39.3	25	41.0
c. 46 - 65 years	35	57.4	22	36.1
Education level				
High (Postgraduate, graduate and diploma)	10	16.4	14	23.0
Middle (High school and vocational school)	37	60.7	39	63.9
Low (Elementary and junior high)	14	23.0	8	13.1
Occupation				
Civil servant, police, military and private sector	9	14.8	16	25.2

Entrepreneur	38	62.3	37	60.7
Laborer	14	23.0	8	13.1
Family income				
a. High (> Rp. 3,460,000)	23	37.7	23	37.7
b. Low (< Rp. 3,460,000)	38	62.3	38	62.3
Number of family members				
a. 2-3 people	3	4.9	11	17.0
b. 4-5 people	52	85.2	42	68.9
c. 6-8 people	6	9.8	8	13.1
Mother				
Age				
a. 26 - 35 years	18	29.5	26	42.6
b. 36 - 45 years	24	39.3	19	31.1
c. 46 - 65 years	19	31.2	16	26.2
Education level				
High (Postgraduate, graduate and diploma)	18	29.5	15	24.6
Middle (High school and vocational school)	30	49.2	38	62.3
Low (Elementary and junior high)	13	21.3	8	13.1
Occupation				
Homemaker	53	86.9	54	88.5
Others	8	13.1	7	11.5

4.2. Characteristics of Families

Based on the information provided in Table 1, for the intervention group, the children are predominantly aged 0-16 years (71.1%) with a majority being male (53.8%) and having an education level of junior high school, elementary school, or kindergarten (72.4%). In contrast, the control group has a similar age distribution with 71.2% of the children aged 0-16 years, a slightly higher proportion of females (48.4%) and a similar educational profile with 71.2% having an education level of junior high school, elementary school or kindergarten. Regarding fathers in the intervention group, the majority are aged 46-65 years (57.4%) have a secondary education level (60.7%) are self-employed (62.3%) and have a low income (62.3%) with the majority of families consisting of 4-5 members (85.2%). In the control group, the majority of fathers are aged 36-45 years (41.0%), have a secondary education level (63.9%), are self-employed (60.7%) have a low income (62.3%), and live in families with 4-5 members (68.9%). As for mothers in the intervention group, a majority is aged 36-45 years (39.3%), has a secondary education level (49.2%), and is predominantly homemakers (86.9%). In the control group, the majority of mothers are aged 26-35 years (42.6%) have a secondary education level (62.3%), and are also predominantly homemakers (88.5%).

4.3. Univariate Analysis

The univariate analyzes of this study included knowledge, attitudes, dental hygiene practices, oral hygiene, gingivitis, caries, availability of dental care facilities and infrastructure, and family culture before the intervention (pre-test) and after the intervention (post-test I and post-test II). The results of the univariate analysis are shown in the following illustration: Table 2 presents the mean values for the pre-test, post-test I and post-test II in the intervention and control groups.

Table 2.
Mean (Pre-test), (Post-test I) and (Post-test II) in the intervention and control groups.

Knowledge	**Group**					
	Intervention			**Control**		
	Mean	**Min.**	**Max.**	**Mean**	**Min.**	**Max.**
Pre-test	11.30	4	19	12.75	7	18
Post-test I	14.36	9	20	12.71	7	18
Post-test II	16.93	13	20	12.79	7	18
Attitude						
Pre-test	49.75	34	63	50.07	34	65
Post-test I	52.61	37	71	50.25	33	62
Post-test II	54.87	41	71	50.21	34	65
Dental hygiene practices						
Pre-test	9.56	4	16	8.56	3	13
Post-test I	13.48	5	20	8.55	3	13
Post-test II	15.46	6	19	8.42	3	13
Oral hygiene index simplified (OHIS)						
Pre-test	2.757	1.4	5.6	2.808	1.4	5.6

Post-test I	0.505	0	2.1	2.803	1.4	5.6
Post-test II	0.29	0	1.7	2.813	1.4	5.7
Index personal hygiene performance modified (PHP-M)						
Pre-test	46.1	27	60	46.44	27	62
Post-test I	29.41	25	35	46.34	27	60
Post-test II	24.61	10	30	46.16	27	60
Gingivitis						
Pre-test	1.316	0.0	2.1	1.444	0.3	2.1
Post-test I	0.903	0.0	2.1	1.439	0.3	2.1
Post-test II	0.062	0.0	1	1.431	0.3	2.1
Status DMF-T (Decayed missing filled teeth)						
Pre-test	1.843	0.5	4.3	2.189	0.5	7.5
Post-test I	1.375	0.1	3.8	2.175	0.4	7.5
Post-test II	0.921	0.0	3.3	2.19	0.4	7.5
Caries status decayed missing filled teeth (DMF-T)						
Pre-test	0.287	0.0	1.6	0.475	0.0	0.3
Post-test I	0.156	0.0	1.3	0.47	0.0	0.3
Post-test II	0.069	0.0	1.3	0.459	0.0	0.3
Availability of dental care facilities and infrastructure						
Pre-test	14.07	10	19	15.16	11	20
Post-test I	15.85	11	20	15.2	11	20
Post-test II	17.03	12	20	15.39	11	20
family habits						
Pre-test	14.49	11	19	13.1	2	19
Post-test I	16.21	12	20	13.07	2	19
Post-test II	17.10	13	20	13.21	2	18

The results showed that the intervention group experienced a significant improvement in almost all categories, including knowledge, attitude, oral hygiene practices, OHIS index, PHP-M index, gingivitis, caries status, availability of facilities and infrastructure, and family habits. The average knowledge in the intervention group increased from 11.30 in the pre-test to 14.36 in post-test I and 16.93 in post-test II with a range of 4 to 20. In contrast, the control group did not show a significant change with an average remaining around 12.75. The attitude in the intervention group also increased from 49.75 in the pre-test to 52.61 in post-test I and 54.87 in post-test II while the control group only changed slightly from 50.07 to 50.25 and back to 50.21. Oral hygiene practices in the intervention group showed an increase from 9.56 in the pre-test to 13.48 in post-test I and 15.46 in post-test II in contrast to the control group which remained around 8.56. The OHIS index in the intervention group decreased from 2.757 in the pre-test to 0.505 in post-test I and 0.290 in post-test II indicating improved oral hygiene while in the control group, it remained almost unchanged at 2.808.

The PHP-M index in the intervention group decreased from 46.10 in the pre-test to 29.41 in post-test I and 24.61 in post-test II while the control group remained around 46.44. Gingivitis in the intervention group decreased from 1.316 in the pre-test to 0.903 in post-test I and 0.062 in post-test II compared to the control group which remained almost the same at 1.444. The caries status (DMF-T) in the intervention group decreased from 1.843 in the pre-test to 1.375 in post-test I and 0.921 in post-test II while in the control group, it remained around 2.189. The caries status (def-t) in the intervention group also decreased from 0.287 in the pre-test to 0.156 in the post-test I and 0.069 in the post-test II while in the control group, it remained around 0.475. The availability of facilities and infrastructure in the intervention group increased from 14.07 in the pre-test to 15.85 in post-test I and 17.03 in post-test II while the control group remained around 15.16. Family habits in the intervention group also increased from 14.49 in the pre-test to 16.21 in post-test I and 17.10 in post-test II compared to the control group which remained around 13.10. Overall, these results indicate that the intervention provided was effective in improving knowledge, attitude, practices and oral health conditions in the intervention group.

4.4. Bivariate Analysis

A bivariate analysis was used to test the hypotheses of this study. Hypotheses were tested using paired sample t-tests and independent t-tests. The results of this statistical analysis are as follows:

Table 3 presents the results of the analysis comparing the intervention and control groups highlighting key differences in outcomes including the mean difference and standard deviation of knowledge in both groups.

Table 3.
Mean difference and standard deviation of knowledge in the intervention and control groups.

Groups	Data	Mean difference ± SD	t	P
Knowledge				
Intervention	Pre-test to post-test I	3.066 ± 2.966	8.073	0.000
	Post-test I to post-test II	2.574 ± 1.746	11.513	0.000
	Pre-test to post-test II	5.639 ± 3.204	13.745	0.000
Control	Pre-test to post-test I	0.033 ± 0.407	0.629	0.532
	Post-test I to post-test II	0.082 ± 0.378	1.692	0.096
	Pre-test to post-test II	0.049 ± 0.284	1.351	0.182
Attitude				
Intervention	Pre-test to post-test I	2.852 ± 4.151	5.367	0.000
	Post-test I to post-test II	2.262 ± 3.130	5.645	0.000
	Pre-test to post-test II	5.115 ± 4.673	8.549	0.000
Control	Pre-test to post-test I	0.180 ± 2.520	0.559	0.578
	Post-test I to post-test II	0.033 ± 2.476	0.103	0.918
	Pre-test to post-test II	0.148 ± 0.628	1.835	0.072
Dental hygiene practices				
Intervention	Pre-test to post-test I	3.918 ± 2.865	10.680	0.000
	Post-test I to post-test II	1.984 ± 1.648	9.400	0.000
	Pre-test to post-test II	5.902 ± 2.942	15.666	0.000
Control	Pre-test to post-test I	0.016 ± 0.288	0.444	0.658
	Post-test I to post-test II	0.125 ± 0.909	1.077	0.286
	Pre-test to post-test II	0.142 ± 0.852	1.299	0.199
Index OHIS				
Intervention	Pre-test to post-test I	2.2525 ± 1.1718	15.013	0.000
	Post-test I to post-test II	0.2148 ± 0.5085	3.298	0.002
	Pre-test to post-test II	2.4672 ± 0.9919	19.426	0.000
Control	Pre-test to post-test I	0.0049 ± 0.0218	1.762	0.083
	Post-test I to post-test II	0.0098 ± 0.0300	2.558	0.057
	Pre-test to post-test II	0.0049 ± .0384	1.000	0.321
Index PHP-M				
Intervention	Pre-test to post-test I	16.689 ± 10.510	12.402	0.000
	Post-test I to post-test II	4.803 ± 6.501	5.771	0.000
	Pre-test to post-test II	21.492 ± 12.793	13.121	0.000
Control	Pre-test to post-test I	0.098 ± 0.436	1.762	0.083
	Post-test I to post-test II	0.180 ± 0.742	1.899	0.062
	Pre-test to post-test II	0.279 ± 0.839	2.593	0.092
Gingivitis				
Intervention	Pre-test to post-test I	0.4131 ± 0.5886	5.481	0.000
	Post-test I to post-test II	0.8410 ± 0.4667	14.074	0.000
	Pre-test to post-test II	1.2541 ± 0.7133	13.731	0.000
Control	Pre-test to post-test I	0.0049 ± 0.0218	1.762	0.083
	Post-test I to post-test II	0.0082 ± 0.0277	2.315	0.077
	Pre-test to post-test II	0.0131 ± 0.0386	2.652	0.057
Caries status DMF-T				
Intervention	Pre-test to post-test I	0.1351 ± 0.1351	27.019	0.000
	Post-test I to post-test II	0.4002 ± 0.4002	8.861	0.000
	Pre-test to post-test II	0.4128 ± 0.4128	17.433	0.000
Control	Pre-test to post-test I	0.0131 ± 0.1360	0.753	0.454
	Post-test I to post-test II	0.0148± 0.1436	0.803	0.425
	Pre-test to post-test II	0.0016± 0.1803	0.071	0.944
Caries status (def-t)				
Intervention	Pre-test to post-test I	0.1311 ± 0.1587	6.455	0.000
	Post-test I to post-test II	0.0869 ± 0.1443	4.702	0.000
	Pre-test to post-test II	0.2180 ± 0.2320	7.339	0.000
Control	Pre-test to post-test I	0.0049 ± 0.0218	1.762	0.083
	Post-test I to post-test II	0.0115 ± 0.0451	1.988	0.052
	Pre-test to post-test II	0.0164 ± 0.0489	2.617	0.054
Availability of dental care facilities and infrastructure				
Intervention	Pre-test to post-test I	1.787 ± 1.450	9.622	0.000

	Post-test I to post-test II	1.180 ± 1.258	7.326	0.000
	Pre-test to post-test II	2.967 ± 1.653	14.020	0.000
Control	Pre-test to post-test I	0.033 ± 0.446	0.574	0.568
	Post-test I to post-test II	0.197 ± 0.891	1.724	0.090
	Pre-test to post-test II	0.230 ± 0.938	1.911	0.061
Family habits				
Intervention	Pre-test to post-test I	1.721 ± 1.113	12.084	0.000
	Post-test I to post-test II	0.885 ± 1.305	5.298	0.000
	Pre-test to post-test II	2.607 ± 1.706	11.935	0.000
Control	Pre-test to post-test I	0.033 ± 0.256	1.000	0.321
	Post-test I to post-test II	0.148 ± 0.654	1.762	0.083
	Pre-test to post-test II	0.115 ± 0.635	1.411	0.163

The research results show that the intervention group experienced significant improvements in various aspects, including knowledge, attitudes, dental and oral health maintenance practices, OHIS index, PHP-M index, gingivitis, DMF-T status, def-t index, availability of facilities and infrastructure, and family habits. For example, knowledge increased from pre-test to post-test II with a mean difference of 5.639 ± 3.204 (t = 13.745, P = 0.000) and attitudes increased from pre-test to post-test II with a mean difference of 5.115 ± 4.673 (t = 8.549, P = 0.000). Dental and oral health maintenance practices showed an increase from pre-test to post-test II of 5.902 ± 2.942 (t = 15.666, P = 0.000) while the OHIS index decreased significantly by 2.4672 ± 0.9919 (t = 19.426, P = 0.000). The PHP-M index decreased by 21.492 ± 12.793 (t = 13.121, P = 0.000) and gingivitis decreased by 1.2541 ± 0.7133 (t = 13.731, P = 0.000). The DMF-t and def-t status also showed a significant decrease as well as an increase in the availability of facilities and infrastructure and family habits. In contrast, the control group did not show significant changes in all measured categories. This indicates that the intervention provided was effective in improving knowledge, attitudes, practices and dental and oral health conditions in the intervention group.

Table 4 presents the mean and standard deviation between the intervention and control groups illustrating the differences in outcomes associated with the treatment.

Table 4.
Mean and standard deviation between the intervention group and control group.

Knowledge	**Groups**	**Mean difference ± SD**	**t**	**p**	Description
Pre-test	Intervention	11.30 + 3.159	2.758	0.068	Not significant
	Control	12.75 + 2.625			
Post-test I	Intervention	14.36 + 2.302	3.741	0.000	Significant
	Control	12.71 + 2.557			
Post-test II	Intervention	16.93 + 1.621	10.550	0.000	Significant
	Control	12.79 + 2.601			
Attitude					
Pre-test	Intervention	49.75 + 6.145	0.276	0.783	Not significant
	Control	50.07 + 6.337			
Post-test I	Intervention	52.61+ 6.606	2.014	0.046	Significant
	Control	50.25 + 6.339			
Post-test II	Intervention	54.87 + 6.893	3.883	0.000	Significant
	Control	50.21 + 6.338			
Dental hygiene practices					
Pre-test	Intervention	9.56 + 3.117	1.851	0.067	Not significant
	Control	8.56 + 2.808			
Post-test I	Intervention	13.48 + 3.176	9.140	0.000	Significant
	Control	8.55 + 2.766			
Post-test II	Intervention	15.46 + 3.020	13.528	0.000	Significant
	Control	8.42 + 2.718			
Index OHIS					
Pre-test	Intervention	2.757 + 0.9190	0.305	0.761	Not significant
	Control	2.808 + 0.9187			
Post-test I	Intervention	0.505 + 0.6352	16.089	0.000	Significant
	Control	2.803 + 0.9172			
Post-test II	Intervention	0.290 + 0.4073	19.418	0.000	Significant
	Control	2.813 + 0.9294			
Index PHP-M (Personal hygiene performance modified)					
Pre-test	Intervention	46.10 + 10.308	0.182	0.856	Not significant
	Control	46.44 + 10.590			
Post-test I	Intervention	29.41 + 2.155	12.252	0.000	Significant

	Control	46.34 + 10.578			
Post-test II	Intervention	24.61 + 6.502	13.602	0.000	Significant
	Control	46.16 + 10.533			
Gingivitis					
Pre-test	Intervention	1.316 + 0.6832	1.117	0.266	Not significant
	Control	1.444 + 0.5772			
Post-test I	Intervention	0.903 + 0.4239	5.849	0.000	Significant
	Control	1.439 + 0.5769			
Post-test II	Intervention	0.062 + 0.2123	17.500	0.000	Significant
	Control	1.431 + 0.5729			
Carries status DMF-T					
Pre-test	Intervention	1.843 ± 0.8846	1.536	0.127	Not significant
	Control	2.189 ± 1.5204			
Post-test I	Intervention	1.375 ± 0.8833	1.379	0.001	Significant
	Control	2.180 ± 1.5181			
Post-test II	Intervention	0.921 ± 0.9375	5.570	0.000	Significant
	Control	2.162 ± 1.4842			
Carries status def-t					
Pre-test	Intervention	0.287 ± 0.3663	2.009	0.068	Not significant
	Control	0.475 ± 0.6347			
Post-test I	Intervention	0.156 ± 0.3845	3.570	0.001	Significant
	Control	0.470 ± 0.6299			
Post-test II	Intervention	0.069 ± 0.3816	4.612	0.000	Significant
	Control	0.459 ± 0.6187			
Availability of dental care facilities and infrastructure					
Pre-test	Intervention	15.07 ± 2.167	2.838	0.053	Not significant
	Control	15.16 ± 2.107			
Post-test I	Intervention	14.85 ± 2.482	1.571	0.012	Significant
	Control	15.20 ± 2.112			
Post-test II	Intervention	17.03 ± 2.097	4.282	0.000	Significant
	Control	15.39 ± 2.131			
Family habits					
Pre-test	Intervention	14.49 ± 1.738	3.492	0.059	Not significant
	Control	13.10 ± 2.587			
Post-test I	Intervention	16.21 ± 1.694	7.948	0.000	Significant
	Control	13.07 ± 2.588			
Post-test II	Intervention	17.10 ± 2.006	9.520	0.000	Significant
	Control	13.21 ± 2.477			

4.5. Analysis of Group Differences (Independent t- test) on Research Variables

The research findings indicate that the intervention significantly impacted knowledge, attitudes, dental and oral health maintenance behaviors and various other health indices. In terms of knowledge, the intervention group demonstrated a notable increase from the pre-test (11.30 ± 3.159) to post-test I (14.36 ± 2.302) with a t-value of 3.741 and a p-value of 0.000. There was also a significant increase from the pre-test to post-test II (16.93 ± 1.621) with a t-value of 10.550 and a p-value of 0.000. In contrast, the control group showed no significant changes. Regarding attitudes, the intervention group exhibited a significant increase from the pre-test (49.75 ± 6.145) to post-test I (52.61 ± 6.606) with a t-value of 2.014 and a p-value of 0.046. Similarly, from the pre-test to post-test II (54.87 ± 6.893), the t-value was 3.883 and the p-value was 0.000. Dental and oral health maintenance behaviors in the intervention group also significantly improved increasing from the pre-test (9.56 ± 3.117) to post-test I (13.48 ± 3.176) with a t-value of 9.140 and a p-value of 0.000. This trend continued from the pre-test to post-test II (15.46 ± 3.020) with a t-value of 13.528 and a p-value of 0.000. The Oral Hygiene Index (OHIS) showed a significant decrease in the intervention group moving from the pre-test (2.757 ± 0.9190) to post-test I (0.505 ± 0.6352) with a t-value of 16.089 and a p-value of 0.000. The decrease continued from the pre-test to post-test II (0.290 ± 0.4073) with a t-value of 19.418 and a p-value of 0.000. The PHP-M index and gingivitis also showed significant improvements with notable decreases in values. Additionally, the DMF-t and def-t statuses in the intervention group significantly decreased. For instance, the DMF-t score dropped from the pre-test (1.843 ± 0.8846) to post-test II (0.921 ± 0.9375) with a t-value of 5.570 and a p-value of 0.000. Improvements were also observed in the availability of facilities and infrastructure as well as family habits within the intervention group.

5. Discussion

The results of the study showed that the family dental care model was proven effective in improving dental health and changing behavior. This is evidenced by a significant increase in knowledge, attitudes and nursing practices. In the group that underwent home visit intervention, there was a significant increase in knowledge aspects (5.639 ± 3.204), in attitude aspects (5.115 ± 4.673), dental and oral care practices (5.902 ± 2.942), and a decrease in the OHIS index (2.4672 ± 0.9919), PHP-M index (21.492 ± 12.793), and gingivitis symptoms (1.2541 ± 0.7133) as well as DMF-t and def-t status. In contrast to the control group, the results of the study showed no significant changes in all categories measured. If referring to the intervention group, there was also an increase from pre- to post-tests, namely in the knowledge aspect increasing from (11.30 ± 3.159) to (14.36 ± 2.302) and (16.93 ± 1.621) in the attitude aspect increasing from (49.75 ± 6.145) to (52.61 ± 6.606) and (54.87 ± 6.893) in care practices increasing from (9.56 ± 3.117) to (13.48 ± 3.176) and (15.46 ± 3.020). Dental and oral health indicators such as OHIS, PHP-M, gingivitis, and DMF-t/def-t also showed a significant increase in the intervention group while the control group did not experience any changes. The availability of facilities and infrastructure significantly improved dental and oral health based on the results of observations. Effective implementation of home dental care requires attention to epidemiological, health service and demographic trends to target individuals at high risk for disease. Early oral health promotion in the dental home requires increased public awareness, professional involvement, and coordination of care between medicine and dentistry. Similarly, Alsumait et al. [23] reported that a home visit program for new mothers significantly increased the frequency of tooth brushing among their children and attendance for regular dental check-ups at age 2 compared to the control group. The home-based approach allowed nurses to provide tailored advice and support within the daily family routines. A study by Aljafari et al.'s [24] research indicates that a home-based dental health education program led by a dental hygienist significantly enhanced children's knowledge, brushing techniques, and frequency compared to a control group. Over 12 months, the intervention group exhibited lower plaque scores and fewer cavities. The program's combination of education, demonstrations, and hands-on activities proved more effective in improving children's dental knowledge, attitudes, and practices than the control group [25]. Furthermore, Lemos et al. [26] reported the results of a community-based intervention involving home visits by community health workers. This intervention successfully increased the frequency of tooth brushing, use of fluoride toothpaste, and regular dental check-ups among participating families compared to the control group. Additionally, according to Plutzer and Spencer [27], a longitudinal study of a prenatal counseling program showed a significant reduction in the prevalence of dental caries in children aged 6 years compared to a control group. Overall, this study adds to the evidence that school-based, community-based, and family-based interventions can improve dental health behaviors and reduce dental health problems in children.

6. Conclusion

Based on the results of the study, it can be concluded that the family dental home visiting model in Baiturrahman has proven to be effective in improving oral health behaviour and status. This is evidenced by the findings in the intervention group which showed significant improvements in dental health indicators including behaviour, caries status, oral hygiene, and gum health compared to the control group in Baiturrahman district, Banda Aceh. The family visiting model has resulted in positive changes in behaviour, brushing frequency and appropriate techniques. On the other hand, dental health services with the visiting model are increasingly popular and accepted as a practical solution in the Baiturrahman district.

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