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Research Article

A Community-Based Approach to Self-Prevention Practices for Periodontal Disease Among Housewives in Derawan Island

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KEYWORDS

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ABSTRACT

Introduction: The prevalence of periodontal disease remains high in Indonesia. Lack of knowledge and limited access to healthcare services can lead to poor dental health status. The aim of this study is to enhance housewives' knowledge of self-prevention practices for periodontal disease on Derawan Island.

Material and Methods: This study utilized a true experiment with a Randomized Pretest-Posttest Control Group Design involving 42 housewives. The intervention included knowledge enhancement using a module book and periodontal health education. Knowledge of periodontal health was assessed using questionnaires, while behavior in periodontal disease prevention was evaluated using the Oral Hygiene Index-Simplified (OHIS). The collected data were analyzed using the Wilcoxon signed-rank test and Spearman's rank correlation test.

Results and Discussions: The majority of respondents had good knowledge (85,72%), while their oral hygiene was in the moderate category (54,55%). An increase in knowledge was observed in 19,05% of respondents. There was a significant difference in knowledge before and after the intervention (P<0,05). However, no significant correlation was found between knowledge and OHIS (P>0,05)

Conclusion: Knowledge of periodontal disease prevention among housewives on Derawan Island has increased. Good knowledge among most housewives can serve as a foundation for independent periodontal disease prevention behaviors. This study is still ongoing to observe changes in self-prevention behavior.

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INTRODUCTION

Poor awareness of periodontal diseases and their consequences has been reported as the most frequent reason for periodontal treatment failure in the community.[1] The condition of oral health in Indonesia remains concerning. The prevalence of oral and dental diseases is still high (57.6%), with the most common cases being dental caries and periodontal disease. The prevalence of periodontitis in Indonesia reaches 74,1%.[2] Limited and unevenly distributed resources, along with difficult access to healthcare services, are contributing factors, considering that Indonesia is the world's largest archipelagic country, consisting of 17.380 islands.[2,3]

Berau is an archipelagic district consisting of 52 islands in East Kalimantan. Derawan Island is one of the islands in Berau. This district has the highest proportion of oral health problems (69.88%) in East Kalimantan, with the most common issues being missing teeth due to extractions (25.43%) and loose teeth (11.56%).[2] There is a relationship between root caries and periodontitis. Untreated carious lesions can increase plaque retention and susceptibility to periodontal disease.[4] Periodontitis is one of the primary causes of tooth mobility.[5] Furthermore, a large portion of the population has poor oral hygiene, bad breath, and incorrect tooth brushing habits.[6]

Periodontitis is a gum infection that can damage the gums, jawbone, and surrounding soft tissues.[7] Periodontal disease is a chronic noncommunicable inflammatory disease that affects the integrity of the tooth-supporting tissues when an imbalance occurs between the periodontal microbiome and the host's inflammatory response.[8] This periodontal disease is often neglected by the community.

A number of studies have demonstrated an association between periodontitis and systemic diseases. Untreated periodontitis can lead to bacteremia, which increases the mortality rate due to systemic diseases such as diabetes mellitus, cardiovascular disease, hypertension, lung disease, stroke, kidney disease, and stress,[9] as well as complications during pregnancy.[10] Periodontal disease and tooth loss are also more prevalent among people who use drugs due to various factors, including poor nutrition, oral hygiene, and limited access to dental care facilities.[11]

The community in Berau has knowledge categorized as very difficult (31.38%) regarding access to dental care practices. Based on residential characteristics, it is a rural area with healthcare access categorized as difficult and very difficult.[12] Therefore, it is important for the community to adopt independent behaviors in preventing periodontal disease. The aim of this study is to enhance the knowledge of housewives on Derawan Island to enable them to independently practice periodontal disease prevention.

MATERIAL AND METHOD

This study is a true experimental design with a Randomized Pretest-Posttest Control Group Design conducted on a community (community trial), specifically on housewives, to assess the difference in knowledge before and after the intervention. The study involves 42 housewives aged between 20 and 62 years. Derawan Island was randomly selected from among the 52 islands in Berau District, while the housewives were chosen through a selected sampling method, with inclusion criteria as health cadres and potential health cadres.

All participants received the intervention, which included being provided with a module book and independent periodontal disease prevention education. They were also asked to complete questionnaires before and after the intervention. A total of 5 valid and reliable questionnaires were used. The education was delivered using lecture and discussion methods, conducted by 3 trained dentists on a rotating basis. The educational content covered: periodontal tissue health and its adverse effects, motivation for independent health behaviors, and proper tooth brushing techniques.

Dental health behaviors were assessed by evaluating oral hygiene using the Oral Hygiene Index Simplified (OHIS). The OHIS examination was conducted by 8 dentists and dental co-assistant students, who had previously undergone calibration. In addition, scaling was performed on the participants to ensure the health of their periodontal tissues. The collected data were analyzed using the Wilcoxon signed-rank test and Spearman's rank correlation test. This study is still ongoing to observe changes in self-prevention behaviors among the participants.

RESULT AND DISCUSSION

A total of 42 participants took part in this study. They were aged between 20 and 62 years, divided into three categories: young, middle-aged, and elderly. The mean age of the participants was 38 (±9.77) years, with the majority being in the young age group (80.95%). These participant characteristics are presented in Table 1.

Table 1. Distribution of participant characteristics

Age (year) Category		N	%	Range	Mean±SD
Young	20-44	34	80.95	20-62	38±9.77
Middle-aged	45-60	7	16.67		
Elderly	61-75	1	2.38		
Total		42	100.00		

Table 2. Distribution of respondents' answers

Code	Quesionnares	Answer	Pretest N	Pretest %	Posttest N	Posttest %	Δ N	Δ %
Q1	Gum redness, swelling, and bleeding can be triggered by the accumulation of plaque and calculus on the teeth.	Correct	35	83.33	42	100.00	7	16.67
		Wrong	7	16.67	0	0.00	-7	-16.67
Q2	Prevention of pregnancy gum disease begins as early as the first month of pregnancy.	Correct	30	71.43	29	69.05	-1	-2.38
		Wrong	12	28.57	13	30.95	1	2.38
Q3	Pregnant women with gum disease are at a higher risk of delivering prematurely and having a baby with low birth weight.	Correct	27	64.29	38	90.48	11	26.19
		Wrong	15	35.71	4	9.52	-11	-26.19
Q4	Regular brushing twice a day, helps prevent calculus buildup.	Correct	32	76.19	35	83.33	3	7.14
		Wrong	10	23.81	7	16.67	-3	-7.14
Q5	The most suitable time is at night before bedtime, as brushing teeth with family, particularly children, will contribute to better oral health for a longer period.	Correct	39	92.86	41	97.62	2	4.76
		Wrong	3	7.14	1	2.38	-2	-4.76

Δ (delta): discrepancy between posttest and pretest

Table 2 shows that all participants completed the questionnaire, resulting in a response rate of 100%. The majority of the questionnaires were answered correctly. All questionnaires showed an improvement in correct answers, except for Q2. Questionnaire Q1 was answered correctly by all participants (100%), followed by Q5, Q3, Q4, and Q2. The greatest increase in correct answers was observed in questionnaire Q1 (16.67%), while the correct answers for questionnaire Q2 showed a decrease (-2.38%).

Table 3. Distribution of participants according to knowledge and oral hygiene categories

Age (year) Category			Knoewledge Pretest N	Pretest %	Posttest N	Posttest %	Δ N	Δ %	OHIS Not checked N	Not checked %	N	%
Young	20-44	Good	21	50.00	28	66.67	7	16.67	9	31.43		
		Fair	10	23.81	5	11.90	-5	-11.91	8	19.05	15	35.72
		Poor	3	7.14	1	2.38	-2	-4.76	1	2.38		
Middle-aged	45-60	Good	6	14.29	7	16.67	1	2.38	0	0.00		
		Fair	1	2.38	0	0.00	-1	-2.38	3	7.14	4	9.52
		Poor	0	0.00	0	0.00	0	0.00	0	0.00		
Elderly	61-75	Good	1	2.38	1	2.38	0	0.00	0	0.00		
		Fair	0	0.00	0	0.00	0	0.00	1	2.38	1	2.38
		Poor	0	0.00	0	0.00	0	0.00	0	0.00		
Total			42	100.00	42	100.00	0	0.00	22	52.38	20	47.62

Δ (delta): discrepancy between posttest and pretest

Table 3 presents the participants' level of knowledge, showing an increase in the good category from 66.67% to 85.72% after the intervention. This improvement resulted from an upward shift of participants from the fair and poor categories to the good category (19.05%). However, some participants remained in the fair (11.90%) and poor (2.38%) categories

During the oral hygiene examination, not all participants agreed to participate, resulting in a response rate of 52.38%. Among those examined, the majority had

good (31.43%) or fair (28.57%) oral hygiene, while the remaining participants fell into the poor category (2.38%). It is important to note that one participant in this study wore a prosthesis, which prevented the oral hygiene examination.

The obtained data indicate a non-normal distribution (Shapiro-Wilk test, $p < 0.05$). Consequently, the nonparametric Wilcoxon signed-rank test and Spearman rank correlation test were applied. The results of the statistical analyses are presented in Table 4.

Table 4. Wilcoxon signed rank and Spearman rank statistical test

		N	Correlation coefficient	p
Wilcoxon signed rank	Posttest - Pretest	42	-	0.008*
Spearman's rho	Knowledge - OH	22	-0.384	0.078

*: significant; OH: oral hygiene

The Wilcoxon signed-rank test was used to assess differences in knowledge regarding periodontal disease prevention before and after the intervention. The results indicated a significant difference in knowledge between the pre- and post-intervention periods (p<0,05).

The Spearman rank correlation test was conducted to examine the relationship between knowledge and the oral hygiene. The results indicated no significant association between knowledge and oral hygiene (p>0,05).

Based on participants' responses to questionnaire item Q1, all respondents were aware that gum redness, swelling, and bleeding can be triggered by the accumulation of plaque and calculus on the teeth. Calculus is considered a major etiological factor in the initiation and progression of periodontal diseases.[7] Symptoms of periodontitis include swollen, red, and bleeding gums, persistent bad breath, gum recession, and loose teeth.[13] Dental calculus, a key contributing factor to gingivitis, is a mineralized dental plaque deposit that forms on dental surfaces either above (supragingival) or below (subgingival) the gingival margin. Dental calculus provides a substratum for plaque retention in proximity to the gingiva,[14] which may serve as an ideal substrate for subgingival microbial colonization, leading to inflammation.[7]

Questionnaires Q2 and Q3 are related statements, indicating that periodontal health examination should be conducted in the first month of pregnancy due to the risk of premature birth and low birth weight. Pregnancy-associated gingivitis is an acute inflammation of the gingival tissues associated with pregnancy. This condition is accompanied by an increase in steroid hormones in the crevicular fluid and a dramatic rise in the levels of P. intermedia and C. rectus, which use steroids as growth factors.[7] Periodontal disease in pregnant women, with a reservoir of organisms and their products, can be considered a risk factor for adverse pregnancy outcomes. Pregnant women with severe periodontitis are at risk of delivering low birth weight babies, premature births, preeclampsia, and miscarriage.[15] Women with periodontitis are 3.2 times more likely to give birth to a low-birth-weight child and 3.4 times more likely to deliver prematurely compared to women without periodontitis.[10] Therefore, oral health examination is essential during the first month of pregnancy. However, this concept was somewhat difficult for participants to understand, resulting in some incorrect responses. Particularly, Q1 showed a decrease in correct answers, with some participants still feeling that an examination early in pregnancy is unnecessary.

Periodontitis, a progressive gum disease, often results from poor oral hygiene habits that allow the accumulation of plaque, a sticky film composed of bacteria. If not removed through regular brushing and flossing, plaque can harden into calculus, creating an ideal environment for bacteria to thrive. The persistent presence of plaque and tartar leads to ongoing gum irritation and inflammation, causing deeper periodontal tissue damage.[13] Brushing twice daily has also been found to improve gingival health.[16] However, the statement in questionnaire Q4 that regular brushing twice a day helps prevent calculus buildup has not been fully understood by all respondents.

Most Indonesians brush their teeth twice a day, but they tend to do so while showering.[17] However, proper tooth brushing practice involves brushing teeth twice a day, in the morning and at night, for at least two minutes

each time,[16] using a fluoridated toothpaste, which is widely recommended.[18] Children are taught to brush their teeth with family members, both in the morning and before bedtime.[19] Parents are highly motivated by the aesthetic benefits of their children's tooth brushing habits. They take pride in their children's clean teeth and feel that their children's appearance reflects the quality of their parenting. Brushing teeth regularly with children has a positive impact in fostering good habits. The development of such a habit can facilitate positive health behaviors in the long term.[20] In this study, almost all participants knew that, according to questionnaire Q5, the most suitable time to brush teeth is at night before bedtime, as brushing teeth with family, particularly children, will contribute to better oral health for a longer period.

Knowledge gaps have been identified across various geographic regions, with the main issues being low awareness and a lack of understanding of the etiology of periodontal disease.[1] In this study, participants showed an increase in knowledge, with the majority falling into the good category. The difference between pre- and post-intervention was statistically significant. However, knowledge about periodontal health still needs to be improved.[6] This is crucial, considering that the participants are health cadres and prospective health cadres, who are in a position to correctly disseminate knowledge about periodontal disease prevention to those around them. Preventing this disease is essential for achieving good oral and general health.[18] The findings of this study are supported by other research, which shows an increase in knowledge following dental health education among elementary school teachers in Denpasar.[17]

According to the I-Change Model, knowledge can raise awareness in an individual, motivating them to take action and transform this awareness into the desired behavior.[21] Routine visits to the dentist can have a positive impact on public knowledge about periodontal health.[22] A positive correlation has been established between oral health knowledge, attitude, and oral hygiene practices.[23] However, in contrast to the results of this study, no correlation was found between knowledge and oral hygiene behavior. Even with good dental health knowledge, an individual may not necessarily act as positively as their knowledge suggests. Factors such as beliefs, myths, and the environment also influence their behavior.[24] This study will be followed up in the future to observe behavior changes after knowledge has increased.

Almost half of the participants in this study were unwilling to undergo an oral hygiene examination. Some felt embarrassed, fearful, and anxious, while others believed it was unnecessary. Feelings of embarrassment and discomfort, as their oral cavities were being examined by others, were still prevalent among some housewives on Derawan Island. Fear may also contribute to delays in seeking treatment.[25] Intense fear and anxiety often lead individuals to avoid dental care.[26] Housewives in Denpasar felt there was no need for a dental examination, as they perceived no issues with their oral health.[24] There are several reasons why individuals avoid dental care, including fear, anxiety, cultural beliefs of certain ethnic groups, and the absence of dental problems.[27]

Healthcare services are one of the determinants that influence health status.[28] Determinants of healthcare services include the availability of facilities, healthcare personnel, and access. Several factors influence healthcare access, such as travel time, location of residence, and transportation costs.[29] On Derawan Island, there is one Public Health Center (Puskesmas),[30] but dental care is rarely available. As a result, when individuals fall ill, they must travel to the capital of Berau Regency, which requires both sea and land transport. The travel time is approximately 3-4 hours by speedboat and car, and an overnight stay is often necessary. This situation poses significant challenges for the local population, as it incurs substantial costs.

The increase in knowledge regarding periodontal disease prevention among housewives, who also serve as health cadres and potential health cadres on Derawan Island, at least offers hope for them to independently adopt preventive behaviors against periodontal disease. This is particularly important, considering the limited access to healthcare in the area. Lack of access to oral health care and inadequate knowledge of proper oral hygiene lead to an abundance of oral disease.[31]

CONCLUSSION

Knowledge of periodontal disease prevention among housewives on Derawan Island has increased, with the majority falling into the good category. Although no significant correlation was found between knowledge and health behavior in this community group, there is a strong expectation that independent behavioral changes will occur as their knowledge improves. This study is ongoing to assess future changes in community behavior.

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