JDHT Journal of Dental Hygiene and Therapy
Volume 7, Nomor 2 Tahun 2026, pp. 114-119
ISSN (online): 2723-1607 DOI: 10.36082/jdht.v7i2.3538

THE EFFECT OF DENTAL HEALTH MAINTENANCE BOOKLET MEDIA ON IMPROVING THE KNOWLEDGE OF DIABETES MELLITUS PATIENTS

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Info Article

Article History:
Received: 19 Sept 2026
Revised: 8 Oct 2026
Accepted: 13 Oct 2026
Available Online: 15 Oct 2026

Keywords:
Booklet, Dental Health Maintenance, Knowledge, Diabetes Mellitus Sufferers

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Published by Politeknik Kesehatan Kemenkes Jakarta I

Abstract

The International Diabetes Federation (IDF) reported in 2021 that approximately 537 million adults worldwide live with diabetes mellitus. Indonesia ranks fifth as the country with the highest number of diabetes sufferers. People with diabetes mellitus have a high prevalence of periodontal tissue damage. Periodontal tissue damage will worsen if sufferers lack knowledge and behaviors to maintain good dental and oral health. This study aims to determine the effect of dental health booklets in improving knowledge of dental and oral health maintenance among people with diabetes mellitus at the Sungai Ulin Community Health Center in Banjarbaru. The study design was pre-experimental with a one-group pre-test and post-test. The population in this study was 30 people, and the sampling technique used was purposive sampling. The results were analyzed using Wilcoxon Signed Rank Test, obtained value p = 0,000 (p < 0,05) so that Ho is rejected and Ha is accepted. The conclusion of this study is that the dental health maintenance booklet has a significant influence on increasing the knowledge of patients with diabetes mellitus at the Sungai Ulin Community Health Center in Banjarbaru. Recommended Education using booklets can be combined with counseling, tooth brushing demonstrations, so that increased knowledge can be followed by changes in dental health maintenance behavior

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Introduction

Asia is the region with the largest populationIndonesia has the highest number of diabetes mellitus sufferers in the world. Diabetes mellitus is becoming an increasingly serious health problem in Indonesia. Based on data International Diabetes Federation according to the International Diabetes Federation (IDF), by 2024, an estimated 20.4 million adults in Indonesia will have diabetes, placing Indonesia fifth in the world in terms of the number of diabetes sufferers. This increase in diabetes prevalence is related to various factors, including changes in lifestyle patterns, urbanization, and genetics (Rosyidah & Cahyono, 2025).

South Kalimantan ranks 15th highest in Indonesia, with a prevalence rate of 1.8%. The number of Diabetes Mellitus cases in the region also rose, increasing from 14,282 cases in 2021 to 15,930 cases in 2022 (Rusmayanti et al., 2024). Similarly, cases in Banjarbaru City increased from 1,992 in 2023 to 4,958 in 2024. Data indicates that among 708 patients with diabetes mellitus at the Sungai Ulin Community Health Center (Puskesmas), only nine individuals had controlled glycemic levels (Diskominfobjb, 2025).

If diabetes mellitus is not properly managed, it can lead to various chronic complications, such as cerebrovascular disease, coronary heart disease, leg vascular disease, eye, kidney, and nerve disorders, and oral complications. One of the most serious complications of diabetes mellitus in dental health is oral diabetes, which includes xerostomia, gingivitis, and periodontitis (Delina et al., 2021). People with diabetes mellitus have a threefold greater risk of developing periodontal disease compared to those without diabetes mellitus. This is due to changes in blood vessels, impaired neutrophil function, collagen synthesis, microbiotic factors, and genetic predisposition (Rizkiyah et al., 2021).

Periodontal disease is a chronic, cumulative, and progressive inflammatory and degenerative condition of the soft tissues and bones supporting the teeth. It is generally caused by local factors, but it can worsen with adverse systemic conditions, such as diabetes mellitus (Purbowati & Kurniawan, 2022).

Research results (Anwar, 2025) show that low knowledge of dental and oral health maintenance in DM patients results in an increased risk of periodontal diseases such as gingivitis and periodontitis. Therefore, effective educational media are needed to address this issue. One such medium is simple, inexpensive, easy to learn at any time, and contains more information and is practical. This research is

highly urgent given the limited availability of educational media specifically about dental health for diabetes patients in primary care. With educational booklets, patients are expected to be more able to independently maintain their dental health and mouth, which can ultimately improve their quality of life and disease control.

A study regarding the use of booklets was conducted on patients with type II diabetes mellitus at the Iskandar Muda Level II Hospital in Banda Aceh to determine the effect of counseling using booklets on the patients' knowledge and attitudes. The results showed that counseling utilizing booklets could improve the knowledge and attitudes of type II diabetes mellitus patients (Trisda & Bakri, 2021). Research (Nurjanah et al., 2025) demonstrates that the use of booklets as an educational medium can enhance adolescents' knowledge regarding premarital sex education. This effectiveness is attributed to the presentation of material that is communicative, systematic, and easily understood by the respondents. In line with this, (Al-Fatihah et al., 2026) reported that health education using booklets significantly improved the knowledge of elderly patients' families regarding the prevention of hypertension recurrence (p-value = 0.000; $p < 0.05$). Although previous studies have demonstrated the effectiveness of booklets in enhancing patient knowledge regarding various aspects of diabetes mellitus (DM), few have specifically utilized this medium in the context of oral health maintenance for DM patients. Yet, oral complications such as periodontitis are serious issues frequently encountered by DM patients and can exacerbate their metabolic condition. Therefore, this study is crucial for addressing the research gap concerning the use of booklets for oral health maintenance among DM patients. Furthermore, the study is contextually relevant as it was conducted within a primary healthcare setting (Community Health Center), which plays a vital role in providing promotive and preventive education for patients with chronic conditions like diabetes mellitus.

Method

The study was conducted at the Sungai Ulin Community Health Center in Banjarbaru, South Kalimantan, between June and August 2026. This is an analytical study designed to investigate a potential cause and effect relationship between two variables. A pre experimental design pecifically a one group pre-test and post-test design was employed. This design was used to assess changes in the knowledge levels of patients with diabetes mellitus regarding oral health maintenance before and after the administration of an intervention using a booklet. Knowledge was measured twice before the intervention (pre-test) and after the intervention (post-test) using the same group of respondents.

The study population consisted of patients with diabetes mellitus targeted for the research. The sample was selected using purposive sampling, a technique involving sample selection based on specific criteria and characteristics aligned with the study's objectives. Inclusion criteria were as follows: patients diagnosed with diabetes mellitus by a healthcare professional; aged 18 years or older; registered at or visiting the study site; able to read and understand Indonesian; willing to participate as a respondent and complete the entire study process; willing to sign an informed consent form; having never previously received the specific booklet on oral health maintenance for diabetes mellitus patients used in this study; and able to complete the pre-test, booklet intervention, and post-test. Exclusion criteria included: patients with cognitive or communication impairments that would hinder questionnaire completion; patients with health conditions preventing participation in all study stages; failure to complete any stage of the study; incomplete questionnaire responses; receipt of other oral health education or learning materials during the study period that could influence the results; and withdrawal from the study before completion. The final sample consisted of 30 respondents who met the inclusion criteria and completed all stages of the study.

The instrument used in this study was a questionnaire designed to measure the level of knowledge regarding dental health maintenance among patients with Diabetes Mellitus. The questionnaire was developed by the authors based on a literature review and tailored to the study's objectives. It consisted of 20 items covering various aspects of dental health maintenance knowledge relevant to patients with Diabetes Mellitus. Prior to its use in the study, the questionnaire underwent validity and reliability testing with 30 respondents who shared similar characteristics with the study sample—namely, patients with Diabetes Mellitus. The test results indicated that the questionnaire items met the criteria for validity and reliability, confirming its suitability as a research instrument.

The research process began with the preparation of the instrument and an educational booklet, followed by obtaining ethical approval and research permits, and subsequently selecting respondents based on inclusion and exclusion criteria. Respondents were provided with an explanation of the study and signed an informed consent form. Next, a baseline knowledge assessment (pre-test) was conducted, followed by the delivery of education on

dental and oral health maintenance for patients with Diabetes Mellitus using the booklet; the booklet was distributed to respondents to take home for further reading. A follow-up assessment (post-test) was then performed. The collected data were processed and analyzed to determine changes in knowledge levels before and after the intervention. As the data were not normally distributed, the Wilcoxon Signed-Rank Test was used for analysis.

This study received ethical approval from the Health Research Ethics Committee of Poltekkes Kemenkes Banjarmasin (reference number: 440/KEPK-PKB/2026). Prior to the study's implementation, all respondents were informed about the objectives, procedures, benefits, and risks, as well as their rights as participants. Respondents willing to participate provided written informed consent before data collection began.

Results

The research data was analyzed to determine the effect of booklets on the knowledge of diabetes mellitus sufferers. The following data were obtained

Tabel 1. Frequency Distribution of Respondents by Gender

No.	Gender	Amount	%
1.	Man	7	23,3
2.	Woman	23	76,7
	Amount	30	100

The data in Table 1 shows that 7 respondents were male, representing 23.3%, and 23 respondents were female, representing 76.7%. The total number of respondents by gender was 30, representing 100%.

Tabel 2. Frequency Distribution of Respondents by Age

No.	Age (years)	Amount	%
1.	>60	12	40
2.	<60	18	60
	Amount	30	100

Based on table 2, it is known that the age of respondents over 60 years is 12 respondents (40%) and the age of respondents under 60 years is 18 respondents (60%).

Tabel 3. Results of Analysis of Dental Caries Knowledge Before and After Counseling with Booklets

Knowledge	*Mean*	*Std. Deviation*	*Min*	*Max*
Before Counseling	53,83	18,97	15	80
After Counseling	86	9,60	65	100
Difference	32,17	14,42	10	60

Based on the table above, the average knowledge score increased from 53.83 to 86.00. All respondents experienced an increase in scores (the minimum difference was 10.00 points, and the maximum increase reached 60.00 points). The standard deviation in the post-test (9.60) was much smaller than the pre-test (18.97), indicating that after the intervention, respondents' abilities became more evenly distributed at a higher level.

Tabel 4. Test Results Wilcoxon Signed-Rank Test

Statistical Test	Statistical value
Z	-4.793[b]
Wilcoxon Signed-Rank	0,000

The results of a study of 30 respondents with diabetes mellitus at the Sungai Ulin Community Health Center in Banjarbaru showed that providing a dental health care booklet resulted in significant changes in the respondents' knowledge levels. Based on the analysis using Wilcoxon Signed Rank Test, obtained value p = 0,000 (p<0,05)**.** These results indicate a significant difference between the level of knowledge before and after education using booklets. Therefore, the research hypothesis that booklets are effective in increasing the knowledge of diabetes mellitus sufferers is accepted.

Discussion

The increase in knowledge following intervention using booklets may be influenced by the booklet's characteristics as an educational medium that presents information systematically, structured, and can be studied independently. Booklets allow respondents to read information repeatedly as needed, allowing them to relearn previously unknown information. Targeted health education is a crucial component of diabetes management because it can help patients understand the disease, its complications, and the health care practices they can perform independently (Br Dalimunte, 2026).

The results of this study align with research by (Nurnaningsih et al., 2026), which found that the use of booklets as a means of promoting oral health significantly improved patients' knowledge and attitudes about oral hygiene. Dental health education for diabetes patients is an important component in increasing knowledge and supporting oral health maintenance behaviors. Targeted education can help patients understand the relationship between diabetes and oral health and raise awareness of the importance of oral care (Nurnaningsih et al., 2026).

This research is also in accordance with the results (Iqbal Faridzi, 2026) about the influence of using e-booklet media to increase knowledge about gingivitis in pregnant women, where there was an increase in knowledge in pregnant women about gingivitis using e-booklet media.

The study results indicate an increase in the respondents' average knowledge regarding oral health maintenance following health education delivered via a booklet. The average knowledge score rose from 55.83 prior to the intervention to 86.00 afterward an increase of 30.17 points. This improvement demonstrates that the booklet serves as an effective educational medium, assisting respondents in receiving and comprehending information on oral health maintenance. The gain in knowledge can be attributed to the systematic presentation of information within the booklet, supported by visual elements that facilitate the respondents' understanding of the material. The use of a booklet represents a form of indirect communication that relies on the sense of sight for information reception. Learning through visual media aids individuals in receiving, understanding, and retaining information; specifically, 83% of the material is absorbed, and 30% is retained (Pramesti et al., 2025).

Knowledge about the importance of oral care significantly influences oral health behavior. Several studies have suggested that one of the causes of the high prevalence of periodontal disease is a lack of knowledge among people with diabetes mellitus about maintaining oral health, which leads to periodontal diseases such as periodontitis and gingivitis (Ade Nina Erniza & Aja Nuraskin, 2024). Oral health maintenance improves with higher levels of knowledge. DM patients who have good knowledge about the relationship between diabetes and periodontal disease tend to visit the dentist more regularly and maintain good oral hygiene (Riani et al., 2022).

The relationship between diabetes mellitus and periodontal disease is bidirectional. Diabetes can increase the risk of periodontal disease, while periodontal inflammation can be linked to glycemic control and diabetes. Therefore, maintaining oral health should not be viewed as a separate issue from diabetes management, but as part of a comprehensive health care effort. Individuals with periodontitis have a higher risk of developing type 2 diabetes during follow-up, while individuals with diabetes also have a higher risk of developing periodontitis (Botelho et al., 2026).

Primary care healthcare workers play a role in providing basic information about dental and oral health when supported by appropriate educational materials. Therefore, the booklet in this study can be a tool for healthcare workers to convey dental health information to people with diabetes more systematically (Sianturi et al., 2021).

Some of the advantages of booklets as a health education medium for people with diabetes mellitus include their simple, practical format, and attractive illustrations and colors, which can increase reader interest and attention. Booklets can present more detailed and systematic information about maintaining dental and oral health for people with diabetes mellitus, such as how to maintain dental and oral hygiene, proper tooth brushing techniques, choosing foods that support dental health, and the importance of regular dental checkups. Furthermore, booklets are easy to carry and can be reread at any time, helping people with diabetes mellitus remember and apply the information provided in their daily lives. In terms of cost, using booklets as an educational medium is also relatively economical and can be reuse (Reza et al., 2024) (Mamahit et al., 2022).

This research is also in line with research from the results of the study (Widyastuti et al., 2025) showed that booklet and animated video media were proven to be effective in increasing knowledge of dental and oral health, with a p value of 0.000 ($p < 0.05$). Booklets are a practical and easy-to-use visual medium for dental health education. They allow for structured and engaging information delivery through a combination of informative text and images (Widyastuti et al., 2025).

The same research results were also obtained from (Dewi et al., 2025) Health Center II West Denpasar in 2025, where the frequency of tooth brushing behavior in pregnant women at Health Center II West Denpasar before being given counseling using Booklet media was (72%) in the sufficient category and after being given counseling with Booklet media increased to (90%) in the good category. The average tooth brushing behavior in pregnant women at Health Center II West Denpasar before being given counseling using Booklet media was (64.9) in the sufficient category and after being given counseling with Booklet media increased (90) to the good category (Dewi et al., 2025).

Based on the research findings ($p = 0.000$), it can be concluded that the use of booklets has a significant impact on improving the knowledge of patients with diabetes mellitus. These results reinforce the importance of utilizing written educational materials as part of dental health promotion strategies in primary healthcare settings. Targeted education regarding oral health for diabetic patients must be conducted continuously, given the close relationship between periodontal health and diabetes.

This study provides evidence that a dental health maintenance booklet is effective in increasing the knowledge of patients with diabetes mellitus at the Sungai Ulin Community Health Center in Banjarbaru. Booklet media can be an alternative health promotion

media that is simple, practical, easy to use, and allows patients to repeat the information they have received. The use of booklets as a health education medium is expected to improve the knowledge and attitudes of people with diabetes mellitus regarding dental and oral health maintenance. This increased knowledge is expected to encourage people with diabetes mellitus to adopt better oral health behaviors and undergo regular dental checkups as part of efforts to maintain overall health. The use of booklets can also support integration of dental health services and diabetes services at the primary health care level.

The results of this study are supported by research (Fatmawati M. Saing, Elna Sari , Rasniah Sarumi, Nur Juliana, 2026) indicating an increase in elderly individuals' knowledge regarding hypertension prevention following education delivered via booklets. Analysis using the Wilcoxon test yielded a p-value of 0.000 (<0.05), signifying a significant difference in knowledge levels before and after the intervention. Prior to the education, the majority of respondents (92.7%) fell into the "sufficient" knowledge category. Following the intervention, the distribution of knowledge levels shifted, with the majority of respondents (80.5%) falling into the "good" category. These findings demonstrate that the use of booklets as an educational medium is potentially effective in enhancing elderly individuals' knowledge regarding hypertension prevention.

These research findings align with the health education theory proposed by (Notoatmodjo, 2020), which explains that delivering health education supported by visual media can enhance understanding by engaging both cognitive and affective aspects. Booklets allow respondents to study information independently and review the material as needed, thereby making health messages easier to comprehend and retain. Furthermore, the use of a combination of text and images facilitates information delivery particularly for individuals with varying literacy levels by rendering health content simpler, more engaging, and easier to understand (Notoatmodjo, 2020).

This study has several limitations. First, it employed a pre-experimental design using a one-group pretest-posttest approach without a control group. Consequently, the researchers could not fully isolate the impact of the booklet intervention from the influence of external factors that might have occurred during the study period. Second, the absence of a control group meant that the observed changes in knowledge could not be compared against a group that did not receive the intervention. Nevertheless, this study design provides preliminary insight into changes in knowledge among patients with diabetes mellitus following education via a booklet. Future research should employ a quasi-experimental design or a randomized controlled trial incorporating a control group and a larger sample size while also considering and controlling for confounding variables, so that the impact of the booklet on knowledge improvement can be evaluated more robustly.

Conclusion and Suggestions

The dental health maintenance booklet has a significant influence on increasing the knowledge of patients with diabetes mellitus regarding dental and oral health maintenance at the Sungai Ulin Community Health Center in Banjarbaru, serving as an educational medium. Healthcare workers are expected to integrate oral health education into their care for diabetes mellitus patients. Education using booklets can be combined with counseling, demonstrations of tooth brushing techniques, and recommendations for regular dental checkups to ensure increased knowledge leads to changes in oral health behavior.

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