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The Effectiveness of a Pocket Book as an Educational Medium in Increasing Knowledge of Diabetes Mellitus Prevention Among Students of SMAN 1 Meulaboh, West Aceh Regency

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Abstract

Background: The World Health Organization (WHO) reported in 2021 that 537 million (10.5%) adults (20-79 years old) had diabetes. In 2024, in West Aceh Regency, Johan Pahlawan District, 748 cases of Diabetes Mellitus were found. Diabetes Mellitus is a non communicable disease whose prevalence is increasing, including in the adolescent age group. Adolescents are a group that is vulnerable to lifestyle changes that can increase the risk of developing Diabetes Mellitus. Therefore, education about the prevention and management of Diabetes Mellitus in adolescents is very important to be carried out from an early age. This research has high urgency in the context of public health, especially in the prevention and management of Diabetes Mellitus in adolescents, because it can provide effective solutions through pocket books as a simple, concise, and easy to carry educational medium. **Objective:** Research to determine the effectiveness of pocket books as educational media in increasing adolescent knowledge about Diabetes Mellitus. **Methods:** This study used a pre-experimental design with a one-group pre-test and post-test approach. The population consisted of 38 students in 10 th grade. The sample size was 38 students, selected using purposive sampling technique with criteria of age 14-15 years. The research instrument was a validated questionnaire on knowledge about Diabetes Mellitus. Data analysis was performed using paired sample t-test with a significance level 0f 0.05. **Results:** The mean difference in scores was -30,395 with a standard deviation of 8,086. The 95% confidence interval ranged from -33,052 to -27,737. The t-test value obtained was -23.172, and the significance value was 0.000 (p<0.05). This indicates that there is a significant difference between the pretest and post-test scores. And the *N-gaiin* test had a mean value of 0.7692 > 0,7 which means the effectiveness is high, and the *N-gain* percentage showed a mean value of 76.9236 or 77.1%, indicating that it is effective. **Conclusion:** Education through pocket books has been proven effective in improving adolescents knowledge about diabetes melitus, making it a practical and easily understandable alternative medium for health promotion.

Keywords: ***Pocket Book, Knowledge, Adolescents, Diabetes Mellitus.***

INTRODUCTION

Prevention and management of diabetes mellitus can be achieved through education, healthy lifestyle modifications, early detection, and risk factor management. By increasing public knowledge and awareness—especially among adolescents—about how to prevent and manage diabetes mellitus, the risk of developing this disease can be reduced, and overall quality of life improved. Effective education can also help adolescents develop healthy habits and raise awareness about the importance of disease prevention. Diabetes mellitus is one of the non-communicable or chronic diseases in which individuals are unable to regulate their blood glucose levels. In a healthy body, the pancreas releases the hormone insulin, which functions to transport glucose to muscles and other tissues for energy storage. Diabetes mellitus is thus a metabolic disorder affecting the distribution of glucose in the body (Irianto, 2014).

Excessive consumption of foods or beverages high in sugar can lead to degenerative diseases, one of which is diabetes mellitus. This disease requires long-term or lifelong care; therefore, continuous attention is needed to monitor blood glucose levels. Management of diabetes should not only occur in healthcare facilities but must also be supported by the family and by developing a positive attitude in patients toward managing the disease (Putri & Isfandiari, 2019). According to the World Health Organization (2022), around 422 million people worldwide suffer from diabetes. Mexico has the highest prevalence, with 59.996 million people (15.2% of its population) affected. The prevalence of diabetes mellitus in Aceh Province reached 184,527 people (53%) in 2021 and continued to increase in 2022 with 189,464 people

(57.36%). In 2023, Aceh ranked first nationally, recording 17,271 cases (1.6%) of diabetes mellitus (SKI, 2023). In West Aceh Regency, data from the District Health Office show annual variations in diabetes prevalence. In 2022, there were 3,268 reported cases, which increased to 5,315 in 2023 but decreased again to 2,964 in 2024 (West Aceh District Health Office, 2024). Most cases were found in Johan Pahlawan Subdistrict, with 783 cases in 2022, increasing to 1,664 in 2023, and then declining to 748 in 2024 (Johan Pahlawan Community Health Center, 2024).

Prevention of diabetes mellitus involves a series of efforts and interventions aimed at reducing the risk of developing the disease—particularly Type 2 Diabetes, which is largely preventable. These preventive measures focus on promoting a healthy lifestyle, early detection, and effective management of risk factors (PERKENI, 2021). Educational media refers to all tools or materials used to convey messages in a clearer and more extensive manner. Various types of media can be used in health education to optimize message delivery, including print, electronic, and display media (such as billboards). A pocket book is one form of print media chosen for its simplicity, conciseness, and portability, yet it contains substantial information. A pocket book is small enough to fit in a pocket, making it easy to carry and read anytime it is needed. By providing education through the distribution of pocket books to adolescents at SMAN 1 Meulaboh, located in Johan Pahlawan Subdistrict, West Aceh Regency, preventive measures for diabetes mellitus can be presented more effectively and understandably. The language used is clear and simple, supported by illustrations and infographics to enhance comprehension among adolescents (Ministry of Health of the Republic of Indonesia, 2019).

Pocket books have distinctive characteristics compared to other learning materials, mainly in terms of their size and practicality. Their small size allows students to learn anytime and anywhere. Despite their compact form, pocket books include comprehensive material summaries designed to help students understand content more efficiently. Research by Rahmawati, Sudirman, & Pukam (2013:162–163) found that pocket books encourage students' learning enthusiasm and increase engagement during lessons. Students showed greater attention and participation, resulting in improved understanding and higher test performance. Learning materials can be effectively understood when students actively construct their own knowledge during the learning process. The purpose of this study is to determine the effectiveness of a pocket book on diabetes mellitus in increasing adolescents' knowledge about its prevention and management. The intervention is applied to tenth-grade students of SMAN 1 Meulaboh, located in Johan Pahlawan Subdistrict, West Aceh Regency. This study aligns with research conducted by Mutiara Pransiska (2024), which showed a significant effect of nutrition knowledge before and after education using a pocket book among students of SMA Negeri 2, Kelayang Subdistrict. Knowledge, in this context, refers to an individual's understanding or awareness acquired through learning or experience.

METHODS

This study is a quantitative research employing a pre-experimental design with a one-group pre-test and post-test approach, aimed at determining the effectiveness of an educational medium in the form of a pocket book on improving adolescents' knowledge about Diabetes Mellitus (DM). The research was conducted at SMAN 1 Meulaboh among tenth-grade students, selected due to the high incidence of Diabetes Mellitus in Johan Pahlawan Subdistrict, which is within the working area of the Johan Pahlawan Community Health Center. The study was carried out from May to June 2025, involving 38 respondents selected through a purposive sampling technique with inclusion criteria of 14–15 years of age.

The study lasted for two weeks. During the first week, a pre-test was administered. Each student was assigned a unique identification code, consisting of a combination of initials and numbers, which remained confidential but recognizable to the researcher. This code was reused during the post-test phase to match pre- and post-test results for each individual. Additionally, the researcher maintained manual attendance records for both testing sessions to ensure participation tracking. Before the intervention, participants were given an initial briefing explaining the research procedure and the importance of full participation, including reading the pocket book thoroughly and attending both measurement sessions. During the second week, three days after the pre-test, the educational intervention using the pocket book was conducted. Three days after the distribution of the pocket book, the post-test was administered. The instrument used was a validated multiple-choice questionnaire containing questions related to Diabetes Mellitus. The collected data were analyzed using the Paired Sample t-Test with the help of SPSS software, and the significance level was set at $p < 0.05$.

RESULTS

Table 1. Distribution of Students' Characteristics

Characteristics

Gender	Number of Students	%
Male	9	23.6
Female	29	76.3
Age	**Number of Students**	**%**
14 years old	10	26.3
15 years old	31	81.5

Based on the data of student characteristics consisting of 38 respondents, it was found that the majority of students were female, totaling 29 students (76.3%), while male students numbered 9 (23.6%). In terms of age group, 31 students (81.5%) were 15 years old, and 10 students (26.3%) were 14 years old.

Table 2. Results of Univariate and Bivariate Paired Sample t-Test on Knowledge Scores Before and After the Distribution of the Diabetes Mellitus Pocket Book Among Adolescents .

	Mean (s.b)	Differenc (s.b)	95% CI	p-value
Pre-intervention score (n=38)	60,66	-30,39	-33,052 - -27,737	<0,000
Post-intervention score (n=3	91,05	30,39	33,052- 27,737	<0,000

Paired t-test; Difference between post- and pre-intervention

The results of the Paired Sample t-Test showed that the mean univariate score before the intervention was 60.66, while the mean bivariate score after the intervention was 91.05. This indicates a difference between the pre-test and post-test means of –30.39 for the univariate analysis and 30.39 for the bivariate analysis. The 95% confidence interval (CI) for the univariate pre-intervention scores ranged from –33.052 to –27.737, while for the bivariate post-intervention scores, it ranged from 27.737 to 33.052. The Sig. (2-tailed) value obtained was 0.000 (< 0.05), indicating that H_0 is rejected and H_a is accepted. Therefore, it can be concluded that there is a significant difference between the pre-test and post-test mean scores, meaning that the pocket book intervention had a significant effect on improving knowledge about Diabetes Mellitus among adolescents at SMAN 1 Meulaboh.

Table 5. Results of the N-Gain Test

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Ngain_Score	38	,50	1,00	,7692	,14695
Ngain_Persen	38	50,00	100,00	76,9236	14,69473
Valid N (listwise)	38				

Based on the results of the N-Gain test calculation, the obtained mean value was 0.7692, which is greater than 0.7, indicating a high category, meaning the intervention had a high level of effectiveness. Furthermore, the N-Gain percentage showed a mean score of 76.9236 or 77.1%, which falls into the effective category. This result indicates that the Pocket Book as a Health Education Medium was effective in increasing adolescents' knowledge about Diabetes Mellitus at SMAN 1 Meulaboh.

DISCUSSION

In efforts to enhance adolescent health literacy regarding Diabetes Mellitus (DM), this study employed a printed educational medium, namely a pocket book. The pocket book was chosen because it is a simple, practical, and easily accessible educational tool for students (Yeni, 2022). The material presented focused on the introduction to Diabetes Mellitus, its risk factors, symptoms, prevention, and healthy lifestyle practices that can be implemented from adolescence.

Printed media such as pocket books offer several advantages. They are portable and can be read anytime and anywhere, allowing students to review information repeatedly without relying on internet access or electronic devices (Ziya, 2024). This aligns with the needs of independent learning, especially among adolescents with busy school schedules. Pocket books are also easier to comprehend because they use simple language and engaging illustrations. However, printed media do have certain limitations. One of them is the lack of interactivity, unlike digital media that can integrate videos or animations to attract attention (Atika, 2022). Another challenge is varying levels of reading motivation among adolescents. Without proper guidance or encouragement, some students may not optimally utilize the pocket book.

Despite these limitations, the findings of this study revealed that educational intervention through a pocket book significantly improved adolescents' knowledge about Diabetes Mellitus. The improvement was evident from the difference in knowledge scores before and after the intervention. The Paired Sample t-Test showed that the mean pre-test score was 60.66, while the mean post-test score was 91.05, with a mean difference of 30.39. The 95% confidence interval (CI) ranged from –33.052 to –27.737, and the t-value was –23.172 with df = 37 and a significance level ($p = 0.000 < 0.05$). These results indicate that the increase in knowledge was not due to chance but rather the effect of the educational intervention using the pocket book. Comprehensive knowledge of DM is crucial since it is a chronic metabolic disease characterized by hyperglycemia, or elevated blood glucose levels, caused by impaired insulin production or utilization. Insulin, produced by beta cells in the pancreas, facilitates the uptake of glucose into body cells for energy. When insulin production is insufficient or when the body's cells fail to respond effectively (insulin resistance), glucose accumulates in the bloodstream, leading to hyperglycemia. If poorly managed, this condition can result in severe complications such as hypoglycemia, diabetic ketoacidosis, hyperosmolar hyperglycemic coma, retinopathy, neuropathy, and nephropathy (Azhari, 2018).

Adolescents are in a dynamic stage of biological, psychological, and social development (Purnama Simangunsong et al., 2024). At this stage, they tend to prefer visual, concise, and relatable media. Therefore, the pocket book format is highly suitable for this age group. According to the Indonesian Dictionary, a pocket book is a small-sized book that can easily fit in a pocket, making it convenient to carry anywhere. In this study, the pocket book was designed with visually appealing layouts, concise yet informative content, and clear, youth-friendly language. This pocket book–based educational approach proved more effective than lecture-based or lengthy written methods. Adolescents generally have short attention spans and may lose focus when information is presented monotonously or in ways unrelated to their daily lives. This finding is consistent with Afandi & Siregar (2020), who reported that education using pocket books effectively improves knowledge within two weeks. Pocket books allow readers to learn at their own pace, making them ideal for educational interventions among students.

The content of the pocket book in this study was tailored to the real-life context of adolescents, featuring familiar examples such as sugar-sweetened beverages, sleep deprivation due to gadget use, and the importance of simple physical activities as preventive measures for DM. This approach made the information not only educational but also practical and relatable to students' lifestyles. The pocket book also effectively introduced early symptoms of DM such as polyuria (frequent urination), polydipsia (excessive thirst), polyphagia (increased appetite), and unexplained weight loss (PERKENI, 2015). After the intervention, students demonstrated better understanding of these symptoms and could distinguish DM from other health conditions.

Furthermore, respondents showed improved understanding of insulin's role in glucose metabolism. They learned that insulin is produced by pancreatic beta cells and functions to help glucose enter body cells. When this process fails, blood sugar levels rise, causing hyperglycemia (Andriani & Hasanah, 2023). Before the intervention, many students found this concept difficult to grasp; however, the structured explanations and visual aids in the pocket book made it much easier to understand. Education also enhanced respondents' awareness of early detection and prevention. This finding aligns with Sari (2016), who emphasized that health education is essential in DM management, as better knowledge leads to better self-care and healthier lifestyles.

The results of this study support previous research by Hidayah & Sopiyandi (2018), which found that educational interventions significantly improve disease-related knowledge. Similarly, Ikbal (2016) highlighted that pocket books are informative, concise, and easy to understand, making them an effective health communication medium for adolescents. Moreover, the study reinforces Notoatmodjo's theory, which states that the more senses involved in learning, the more effectively information is retained. The pocket book, enriched with visual elements such as images, diagrams, and attractive layouts, helps adolescents grasp and retain technical health concepts like insulin function, DM symptoms, and preventive steps. The researcher assumes that adolescents' knowledge about DM was initially low due to limited exposure to systematic health information. Since adolescence is a transitional stage that demands engaging and accessible learning tools, pocket books serve as an ideal educational medium — flexible, portable, and tailored to their fast-paced and dynamic lifestyles. In conclusion, this study demonstrates that the use of pocket books as an educational

medium is highly effective in increasing adolescents' knowledge about Diabetes Mellitus. The pocket book not only provides essential information but also fosters awareness and healthy behaviors from an early age. Therefore, it can serve as a practical and replicable health promotion tool in schools and youth communities to support preventive efforts against Diabetes Mellitus in the future.

CONCLUSION

Based on the results of the study, it can be concluded that providing education through the use of pocket books is effective in increasing adolescents' knowledge about Diabetes Mellitus. This is evidenced by a significant difference between the knowledge scores before and after the intervention, where the average pre-test score of 32.60 increased to 65.79 in the post-test. The results of the paired sample t-test showed that the mean difference in scores was -30.395, with a t-value of -23.172 and a p-value of 0.000 ($p < 0.05$), indicating that the improvement was statistically significant. The pocket book has proven to be an appropriate educational tool for adolescents, as it is practical, easy to understand, and capable of enhancing health literacy independently. Therefore, pocket books can serve as an alternative educational medium in health promotion efforts, particularly in the prevention and control of non-communicable diseases such as Diabetes Mellitus among adolescents.

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