Journal Syifa Sciences and Clinical Research (JSSCR)
Volume 8 Number 1, 2026
Journal Homepage: http://ejurnal.unq.ac.id/index.php/jsscr, E-ISSN: 2656-9612 P-ISSN:2656-8187
DOI: https://doi.org/10.37311/jsscr.v8i1.35885

CareDia Book Education for Type 2 Diabetes: A One-Group Pre–Post Study at Pandak II Health Centre

Mexsi Mutia Rissa[1*], Jingga Putri Rindiani[2]

[1,2] Diploma III Pharmacy Programme, Indonesian Pharmacy Academy Yogyakarta, Jl. Veteran Gg. Jambu, Pandeyan, Umbulharjo District, Yogyakarta City, Special Region of Yogyakarta, 55161, Indonesia

** Corresponding author. Email: mexsi.pharm@afi.ac.id*

ABSTRACT

Diabetes mellitus is a degenerative disease and one of the most prevalent chronic conditions in Indonesia. Medication adherence and self-care behaviour play an important role in achieving optimal disease control in patients with type 2 diabetes mellitus. Educational support using structured media such as the CareDia Book may facilitate behavioural improvement. This study aimed to evaluate changes in medication adherence and self-care behaviour following CareDia Book–based education among patients with type 2 diabetes mellitus at the Pandak II Community Health Centre. A quasi-experimental one-group pre–post design was conducted involving 75 Prolanis participants selected using total sampling based on predefined criteria. Demographic characteristics and outcomes, including medication adherence and diabetes-prevention behaviour, were assessed using validated questionnaires before and after the intervention. Most participants were female (81.33%), had basic education (44%), were unemployed (72%), and had a diabetes duration of more than five years (81.33%). Behaviour and adherence scores increased significantly after exposure to the CareDia Book. These improvements were associated with the educational intervention during the study period. In conclusion, CareDia Book–based education was associated with short-term improvements in medication adherence and self-care behaviour among patients with type 2 diabetes mellitus. Longer follow-up studies are needed to assess the durability and clinical impact of these changes.

Keywords:
Type 2 diabetes; Medication adherence; Patient education; MARS-10; Quasi-experimental; Prolanis

Received:	*Accepted:*	*Online:*
2025-12-06	*2026-01-20*	*2026-01-28*

1. Introduction

Diabetes mellitus is a chronic disease that affects the body's metabolic processes and is characterised by elevated blood glucose levels. If not managed properly, this condition can cause damage to various vital organs, such as the heart, blood vessels, eyes, kidneys, and nerves. The most common type is type II diabetes mellitus, a condition in which the body does not respond optimally to insulin or does not produce sufficient amounts of insulin [1].

According to the International Diabetes Federation (IDF), the global number of people living with diabetes mellitus is projected to reach 590 million by 2025, with more than 90% of cases attributed to type 2 diabetes, largely influenced by socioeconomic, demographic, environmental, and genetic factors [2]. In Indonesia, the IDF estimated 20.4 million people with diabetes in 2024, with a projected increase to 28.6 million by 2050 [2].

At the regional level, data from the 2023 Indonesian Health Survey (SKI) indicate that the prevalence of diabetes mellitus in D.I. Yogyakarta is 2.9%, ranking second highest nationally after DKI Jakarta [3]. This highlights the substantial local burden of diabetes and underscores the importance of effective community-based interventions in primary healthcare settings.

Diabetes mellitus requires long-term management through changes in patient behaviour, including adherence to treatment, diet management, and physical activity. One factor that influences adherence is the patient's own level of knowledge [4]. However, the level of adherence of DM patients in managing their disease is still relatively low. Various factors such as lack of understanding, low motivation, and limited educational support are major obstacles in this process [5]. In this study, *CareDia Book*—an educational guidebook compiled based on patient needs—is expected to be a solution to improve compliance and facilitate behavioural change in DM patients.

Research shows that the level of compliance of DM patients with treatment and healthy lifestyles in Indonesia still varies and in many cases is classified as low to moderate [4]. Meanwhile, among patients undergoing a DM diet, approximately 58.2% reported compliance with dietary recommendations. However, despite relatively high dietary adherence, more than half of respondents (55.6%) still had fasting blood glucose levels ≥ 126 mg/dL, and nearly half (46.3%) were obese, indicating that optimal glucose control requires comprehensive adherence to all aspects of therapy — medication, diet, and lifestyle [6].

Thus, in the context of the increasing burden of diabetes mellitus, improving patient adherence and self-care behaviour remains a critical component of disease management. Without adequate adherence to pharmacological therapy and preventive lifestyle practices, efforts to control diabetes and reduce its complications are unlikely to be optimal. Structured and patient-tailored educational interventions, such as the CareDia Book, may offer a practical approach to support these goals. Therefore, this study aimed to evaluate whether CareDia Book–based education increases medication adherence, as measured by the Medication Adherence Report Scale (MARS-10), and diabetes prevention behaviour scores among Prolanis participants at the Pandak II Community Health Centre.

2. Methods

Study design

This study employed a quasi-experimental one-group pre–post design. The research procedure consisted of an initial assessment (pre-test), followed by an educational intervention using the *CareDia Book*, and a subsequent reassessment (post-test). The study aimed to evaluate changes in medication adherence and self-care behaviour among patients with diabetes mellitus following the intervention.

Setting and study period

The study was conducted at the Pandak II Community Health Centre, Bantul Regency, Special Region of Yogyakarta (55761), from May to July 2025, during routine activities of the Prolanis programme for patients with diabetes mellitus.

Population and sample

The study population comprised all patients with type 2 diabetes mellitus who were registered and actively participated in the Prolanis programme at the Pandak II Community Health Centre during the study period.

A total of 75 patients were included using a total sampling (saturated sampling) technique, in which all eligible patients were recruited based on predefined inclusion and exclusion criteria.

Inclusion criteria were:

- Diagnosed with type 2 diabetes mellitus by a physician.
- Registered as an active participant in the Prolanis programme at Pandak II Community Health Centre.
- Aged 18–60 years.
- Able to read and understand Indonesian.
- Willing to participate and provide written informed consent.
- Completed both the pre-test and post-test assessments.

Exclusion criteria were:

- Patients with severe cognitive impairment, psychiatric disorders, or communication difficulties that could interfere with questionnaire completion.
- Patients with severe complications or acute conditions requiring hospitalisation during the study period.
- Patients who were absent during the intervention session or did not complete the post-test evaluation.

Instruments

Data were collected using the following instruments:

- Informed consent form, used to obtain written consent from all participants prior to data collection.
- Respondent biodata form, which recorded demographic characteristics including age, sex, education level, occupation, and duration of diabetes mellitus.
- *CareDia Book*, an educational guidebook developed to support diabetes self-management, covering disease information, medication use, dietary management, physical activity, blood glucose monitoring, and lifestyle modification.
- Medication Adherence Report Scale (MARS-10) questionnaire.
- Diabetes prevention behaviour questionnaire.

The MARS-10 questionnaire consists of 10 items assessing medication-taking behaviour. Each item is rated using a 5-point Likert scale ranging from 1 (always) to 5 (never), with higher total scores indicating better medication adherence. The instrument has been previously validated and demonstrated acceptable internal consistency in this study, with a Cronbach's alpha of 0.747, indicating good reliability for measuring medication adherence among patients with diabetes mellitus [16].

The diabetes prevention behaviour questionnaire was adopted from Upik Mei Anggraini and comprises 21 items assessing self-care behaviours related to diet, physical activity, and lifestyle modification. Responses are measured using a 4-point Likert scale: *routinely (4)*, *often (3)*, *sometimes (2)*, and *never (1)*. This instrument has been previously validated and shown to be reliable for assessing diabetes-related preventive behaviour.

Validity and reliability

The validity of the *CareDia Book* media was tested through *expert judgement* to assess the suitability of the content and appearance. The appearance aspects assessed included: design suitability, colour selection, background suitability, sentence clarity, attractiveness of text and images, and suitability of text and image size.

The assessment used a media questionnaire with a score range of 1–5 and the following categories:

- Very good: $X \geq 4.21$
- Good: $3.40 < X \leq 4.21$
- Fairly good: $2.60 < X \leq 3.40$
- Poor: $1.79 < X \leq 2.60$
- Very poor: $X \leq 1.79$

The *CareDia Book* received an average score of 4.1 (good category). The reviewer's suggestions for improvement were accommodated before the media was used in the research.

Data analysis

Univariate analysis was used to describe the characteristics of respondents (gender, age, education, occupation, body mass index, duration of DM) and the distribution of compliance levels. The analysis was performed using frequency distribution and percentages.

On the MARS-10 questionnaire, "no" answers to items 1–6 and 9–10 were scored 1, while "yes" answers were scored 0. For items 7–8, "yes" answers were scored 1 and "no" answers were scored 0. Compliance levels were categorised [17]:

- Non-compliant: score 0–3
- Fairly compliant: score 4–6
- Compliant: score 7–10

Bivariate analysis (e.g., *paired t-test* or appropriate non-parametric test) was used to examine differences in scores before and after the intervention with a significance level of $p < 0.05$.

Ethical Approval

This study was approved by the Research Ethics Committee of Ahmad Dahlan University (Approval No. REC-UAD/01/02/02-2025/025). Written informed consent was obtained from all participants prior to enrolment in the study.

3. Results and Discussion

Demographic Characteristics

The demographic characteristics of the respondents included age, gender, education, occupation, and duration of diabetes mellitus. The distribution of respondents at the Pandak II Bantul Community Health Centre can be seen in **Table 1**.

Table 1. Demographic Distribution of Respondents

Characteristics		**n**	**%**
Age	< 60 years	75	100
	≥ 60 years	0	0
Gender	Male	14	18.67
	Female	61	81.33
Education	Primary	33	44
	Junior High School	21	28
	High School	18	24
	Tertiary	3	4

Occupation	Working	21	28
	Employed	54	72
	Unemployed/Household		
Duration of illness	≤ 5 years	14	18.67
	> 5 years	61	81.33

Based on data from 75 respondents with diabetes mellitus (DM) at the Pandak II Community Health Centre, a clear picture of their demographic profile can be drawn. In general, female patients predominate, with 61 respondents (81.33%) compared to only 14 male respondents (18.67%). This dominance reflects the tendency of women to be more proactive in accessing health services at health centres, as well as being related to hormonal risk factors present in women [7].

Furthermore, this profile is reinforced by data on employment status and education level. The majority of respondents, namely 54 people (72%), reported that they were not working, which correlates strongly with the high number of female respondents who were housewives. This is in line with research conducted by Fadinata in 2020 at the Pandian Community Health Centre in Sumenep Regency [8].

From an educational perspective, most patients have a primary to secondary education background, with primary school graduates accounting for the largest proportion (44%), followed by junior high school (28%) and senior high school (24%). Low educational attainment implies the need for simple, visual, and systematic educational media. A recent study by Hartati et al. in 2023 confirms that low health literacy is a major obstacle for DM patients in understanding medical instructions, so the use of easy-to-understand educational media is highly recommended [10].

Another important aspect is the duration of the disease. Data shows that the majority of patients, namely 61 people (81.33%), have had diabetes for more than five years. This indicates that most of the prolanis patients at the Pandak II Community Health Centre are long-term sufferers. Therefore, healthcare services should not only focus on daily blood sugar control but also be highly vigilant about the risk of chronic complications that may arise, such as nerve, eye, and kidney disorders [11] [15]. Consequently, screening and long-term complication management programmes are crucial for these prolanis patients. Overall, it can be concluded that the primary target of diabetes mellitus services at the Pandak II Community Health Centre is female patients with a basic level of education, who are unemployed and have been living with the disease for a long time [12] [13]. A deep understanding of these characteristics is key to designing effective education programmes, conducting targeted clinical monitoring, ensuring medication adherence, and ultimately improving patients' quality of life.

Distribution of Compliance Levels

The level of compliance of type 2 DM patients from the results before (pre-test) and after (post-test) treatment and the effect of intervention using the *CareDia Book* on the dietary compliance behaviour of type 2 diabetes mellitus patients. The results of the distribution of compliance levels can be seen in **Table 2**.

Table 2. Compliance Behaviour Distribution Table

Category	Compliance Level	n	
Pre-test	Compliant	48	64
	Moderately compliant	27	36
	Non-compliant	0	0
Pre-test	Compliant	75	100
	Sufficiently compliant	0	0

Non-Compliant	0	0

Based on Table 2 it can be seen that most respondents fall into the compliant category. The MARS-10 questionnaire only has "yes" and "no" answers, whereas the MARS-5 questionnaire has answers such as never, rarely, sometimes, often, and always, which can cause differences in perception between individuals. Therefore, the MARS-10 questionnaire is considered better because it does not cause differences in perception between individuals. [9] [14].

The results showed that the intervention using the *Cardeia Book* educational media had a positive and significant effect on the compliance levels of diabetes mellitus (DM) patients who were members of the Chronic Disease Management Programme (Prolanis) at the Pandak II Community Health Centre in Bantul. The increase in compliance scores after the intervention indicated that *the Cardeia Book* was an effective tool for encouraging behavioural change in patients.

The success of this intervention can be explained by several factors. First, *Cardeia Book* presents information about DM management in a structured, concise, and visually appealing format. Given the demographic profile of patients at Pandak II Community Health Centre, who tend to have a primary to secondary level of education, long text-based educational media is often ineffective. In contrast, pocket books such as *Cardeia Book* with infographics, pictures, and simple language are easier for patients to understand and remember. This is in line with the theory that educational media designed according to the characteristics of the target audience will increase understanding and retention of information.

Secondly, providing educational media in the form of books that patients can personally own gives them a sense of *empowerment* and increases their *self-efficacy*. Patients are no longer just passive recipients of information during counselling, but have a source of knowledge that can be accessed at any time at home. When patients feel more knowledgeable and better able to manage their illness, their confidence in adhering to medication schedules, dietary recommendations, and physical activity will increase. Self-efficacy is a strong predictor of long-term treatment adherence, especially for chronic diseases such as diabetes mellitus.

Behaviour of Diabetes Mellitus Patients

Differences in the behaviour of diabetes mellitus (DM) patients before and after being given an intervention using *CareDia Book* media. This discussion aims to analyse the effectiveness of intervention media in improving patients' understanding, motivation, and compliance with medical advice related to health control, diet, and exercise. A comparison of patient behaviour data from completed questionnaires will form the main basis for identifying changes that have occurred, thereby enabling conclusions to be drawn about the strategic role of the *CareDia Book* media as an educational tool in encouraging positive and sustainable behavioural change in DM patients. The results of the behavioural difference analysis can be seen in **Table 3**.

Table 3. Results of Analysis of Behavioural Differences Before and After the *CareDia Book* Media Intervention

	Median (Min-Max)	Mean	P
Pre-test	13 (39–52)	45.97	0.001
Post-test	5 (51–56)	53.45	0.001

Based on the analysis, behavioural scores among patients with diabetes mellitus showed a statistically significant increase after exposure to the CareDia Book educational intervention ($p < 0.001$). This finding indicates that the improvement in

behaviour scores was associated with the use of the CareDia Book during the study period, rather than demonstrating a definitive causal effect, given the one-group pre–post study design without a control group.

These behavioural changes can be seen in several aspects, namely increased knowledge, where after intervention, patients demonstrated a better understanding of the symptoms, causes, effects, and prevention of DM. This can be seen from the increase in scores on questionnaires related to seeking information about DM. Then, in terms of diet compliance, patients demonstrated healthier eating patterns. They tend to more regularly avoid foods high in cholesterol and fat, as well as fast food. Conversely, consumption of low-calorie foods such as vegetables and fruits has increased. Physical activity has also increased, with an increase in the frequency and duration of exercise. Patients are more motivated to exercise regularly, including warm-ups and cool-downs, and are more active physically at home. Overall, the results of this study prove that *CareDia Book* media has successfully become an effective educational tool in changing the behaviour of DM patients. This change is very important in the management of DM, as positive and consistent behaviour can help control blood sugar levels, prevent complications, and improve the quality of life of patients.

These findings also support previous studies stating that planned educational interventions using appropriate media are an important pillar in DM management. Unlike verbal counselling, which is temporary in nature, *CareDia Book* serves as a "reminder" and a continuous practical guide. This is particularly relevant for Prolanis patients who need ongoing support to maintain their long-term compliance in order to prevent complications.

However, this study has limitations, such as the relatively short intervention period and the inability to measure the long-term impact after several months without follow-up. Therefore, future studies are recommended to measure the sustainability of the effects of *CareDia Book* over a longer period and perhaps compare its effectiveness with other educational media, such as videos or digital applications. In conclusion, the intervention using the *CareDia Book* medium proved to be an effective strategy for improving DM patient compliance in the Prolanis group at the Pandak II Community Health Centre. This medium successfully translated complex medical information into practical and accessible guidelines. It is recommended that health centres adopt *CareDia Book* as one of the standard educational tools in the Prolanis programme to support the achievement of optimal and independent DM management by patients.

4. Conclusion

The findings of this study indicate that exposure to the CareDia Book during the study period was associated with significant short-term improvements in medication adherence and self-care behaviour scores among patients with type 2 diabetes mellitus. However, due to the pre–post design without a control group, causal inference cannot be established. Furthermore, longer follow-up is required to determine whether these improvements are sustained over time. Therefore, the CareDia Book may serve as a useful initial educational tool to support diabetes self-management, but ongoing reinforcement and structured support are likely needed to achieve durable behavioural change.

Acknowledgements:

The author would like to express gratitude to the Bantul District Health Office, Pandak II Community Health Centre, and all health workers and Prolanis group respondents for their participation and support in this study. Special thanks are also extended to the

Indonesian Pharmacy Academy Yogyakarta for providing facilities and assistance throughout the research process.

Conflicts of Interest:

The author declares that there are no conflicts of interest related to the publication of this journal.

References

[1] World Health Organization, "Diabetes fact sheet," Geneva, Switzerland, 2024. [Online]. Available: https://cdn.who.int/media/docs/default-source/searo/nde/sde-diabetes-fs.pdf?sfvrsn=7e6d411c_2

[2] International Diabetes Federation, *IDF Diabetes Atlas*, 10th ed., Brussels, Belgium: IDF, 2025. [Online]. Available: https://diabetesatlas.org/resources/idf-diabetes-atlas-2025/

[3] Ministry of Health of the Republic of Indonesia, "Indonesian Health Survey (SKI) 2023," Jakarta, Indonesia, 2024. [Online]. Available: https://www.badankebijakan.kemkes.go.id/en/hasil-ski-2023/ (Companion PDF: "SKI 2023 in Figures"). [Online]. Available: https://docu.bkkbndiy.id/wp-content/uploads/2024/05/SKI_2023-DALAM-ANGKA_BKPK_KEMENKES_compressed.pdf

[4] E. Zairina, G. Nugraheni, A. Sulistyarini et al., "Factors related to barriers and medication adherence in patients with type 2 diabetes mellitus: a cross-sectional study," *Journal of Diabetes and Metabolic Disorders*, vol. 21, no. 1, 2022. [Online]. Available: https://doi.org/10.1007/s40200-021-00961-6

[5] D. A. Perwitasari and S. Urbayatun, "Treatment adherence in patients with chronic diseases: A review," *Indonesian Journal of Pharmacy*, vol. 7, no. 1, pp. 33–41, 2016. [Online]. Available: https://jurnal.ugm.ac.id/ijpr/article/view/7262

[6] M. Pujiastuti, "Diet compliance of patients with diabetes mellitus," *J. Health Sci. Nutr.*, vol. 2, no. 1, Feb. 2023. [Online]. Available: https://ejournal.marqchainstitute.or.id/index.php/Jhsn/article/download/49/48

[7] L. Zhang, M. Xu, and H. Zhao, "Gender differences in diabetes management behaviour: A population-based study," *BMC Public Health*, vol. 22, 1245, 2022. [Online]. Available: https://doi.org/10.1186/s12889-022-11234-5

[8] L. Hartati and S. Prasetyo, "Health literacy and diabetes self-management: A cross-sectional study," *Journal of Public Health Research*, vol. 12, no. 3, 2023. [Online]. Available: https://doi.org/10.4081/jphr.2023.42

[9] M. Stirratt, A. Dunbar-Jacob, S. Crane, N. Simoni, K. Czajkowski, and D. S. Huntley, "Advances in measuring adherence and developing interventions to improve medication-taking behaviour," *Health Psychology and Behavioral Medicine*, vol. 10, no. 1, pp. 198–210, 2022. [Online]. Available: https://doi.org/10.1080/21642850.2022.2073845

[10] X. Li, J. Chen, and Y. Wang, "Effectiveness of printed educational materials on medication adherence in patients with chronic diseases: A systematic review," *Patient Education and Counseling*, vol. 103, no. 8, pp. 1657–1665, 2020. [Online]. Available: https://doi.org/10.1016/j.pec.2020.03.012

[11] Y. Zheng, S. H. Ley, and F. B. Hu, "Global burden of type 2 diabetes and advances in prevention," *Nature Reviews Endocrinology*, vol. 17, no. 10, pp. 537–548, 2021. [Online]. Available: https://doi.org/10.1038/s41574-021-00543-7

[12] C. L. W. Wong, B. Y. Q. Lee, and S. Y. Low, "Duration required for lifestyle behaviour change in patients with type 2 diabetes: A prospective study," *Chronic Illness*, vol. 17, no. 4, pp. 421–431, 2021. [Online]. Available: https://doi.org/10.1177/1742395320951228

[13] Q. Chen, L. Fang, and H. Rui, "The knowledge–attitude–behaviour model in chronic disease management: A review," *Frontiers in Public Health*, vol. 10, 873456, 2022. [Online]. Available: https://doi.org/10.3389/fpubh.2022.873456

[14] A. Wakjira Garedow, T. M. Jemaneh, A. G. Hailemariam, et al., "Lifestyle modification and medication use among diabetes mellitus patients attending Jimma University Medical Center, Jimma zone, south west Ethiopia," *Scientific Reports*, vol. 13, art. 4956, 2023. [Online]. Available: https://doi.org/10.1038/s41598-023-32145-y

[15] A. Bakri, F. Nurhayati, and R. Dewi, "Lifestyle modification determinants in patients with type 2 diabetes mellitus: A cross-sectional study," *International Journal of Health Sciences*, vol. 17, no. 1, pp. 55–63, 2023. [Online]. Available: https://doi.org/10.53730/ijhs.v17n1.21984

[16] A. Wibowo, R. Nugraheni, and D. Lestari, "Validation of the Indonesian version of the Medication Adherence Report Scale (MARS-10) in patients with diabetes mellitus," *Journal of Pharmaceutical Health Services Research*, vol. 11, no. 4, pp. 365–372, 2020. [Online]. Available: https://doi.org/10.1111/jphs.12378

[17] M. Bastian, "Evaluation model for health education media," *Journal of Health Education*, vol. 51, no. 4, pp. 495–505, 2021. [Online]. Available: https://doi.org/10.1080/10556699.2021.1895432