



Impact of self-care training on prediabetes prevention among UIN Jakarta employees

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ABSTRACT: Prediabetes is a preclinical condition with a high risk of progressing to type 2 diabetes. This study evaluated an eight-week self-care training program among UIN Jakarta employees, facilitated by Public Health Pharmacy and integrating Avicenna's classical health principles with WhatsApp-based digital education. A quasi-experimental pre-post design without a control group was applied to 39 participants meeting prediabetes criteria. Clinical parameters assessed included random blood glucose (RBG), systolic blood pressure (SBP), body mass index (BMI), and waist circumference (WC), along with self-care practices using the Indonesian version of the Diabetes Self-Management Questionnaire (DSMQ). Data were analyzed using Wilcoxon signed-rank test and Cohen's dz effect size. Significant improvements were observed in SBP (dz = -0.530), BMI (dz = -0.253), WC (dz = -0.320), and DSMQ score (dz = +0.793), while RBG showed no significant change. These findings support a culturally relevant, cost-effective model for workplace-based prediabetes prevention. In line with American Diabetes Association (ADA) 2025 Standards of Care, the approach emphasizes person-centered Diabetes Self-Management Education and Support (DSMES) and team-based support; European Society of Cardiology (ESC) 2024 guidelines align the observed SBP reduction with recommended targets after lifestyle intervention. Future programs should extend duration and adopt hybrid delivery for optimal glycemic control. [25,27,28].

Keywords: self-care; public health pharmacy; DSMQ; digital intervention.

Introduction

Type 2 diabetes mellitus is a chronic metabolic disease characterized by hyperglycemia due to impaired insulin secretion and insulin resistance. Before reaching the stage of diabetes, individuals often experience a preclinical condition called prediabetes, which is an increase in blood glucose levels that do not meet the criteria for diabetes. Prediabetes has a high risk of progressing to type 2 diabetes and contributes to cardiovascular and metabolic complications if not treated early [1].

Globally, the prevalence of prediabetes continues to rise. According to the *International Diabetes Federation* (IDF), more than 352 million people are estimated to have prediabetes in 2021, and this number is projected to increase significantly in the coming decade [2]. In Indonesia, Riskesdas data shows that the prevalence of glucose tolerance disorders reaches 10–15% in the adult population, with an increasing trend in the work and urban environments [3]. At the State Islamic University (UIN) Syarif Hidayatullah Jakarta, preliminary screening results showed that most employees had metabolic risk factors

such as central obesity, hypertension, and a sedentary lifestyle.

Pathophysiologically, prediabetes is characterized by insulin resistance and pancreatic beta cell dysfunction, which leads to impaired glucose and lipid metabolism. Major risk factors include obesity, lack of physical activity, a high-calorie diet, chronic stress, and a family history of diabetes [4]. Prediabetes prevention requires a multidimensional approach, including lifestyle modification, health education, and ongoing monitoring.

One approach that has proven to be effective is self-care, which is the ability of individuals to manage their health conditions independently through behavior changes, healthy diet, physical activity, stress management, and adherence to therapy. Previous studies have shown that self-care-based interventions may lower the risk of progressing prediabetes to type 2 diabetes [5].

Public Health Pharmacy (PHP) integrates public health principles into pharmacy practice to improve population health

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outcomes. This includes health education, disease prevention, promotion of healthy lifestyles, and cross-sector collaboration to enhance access to pharmaceutical services. According to ASHP (27), FIP/WHO Guidelines (29), and Strand & Miller (28), PHP plays a critical role in supporting primary health systems and community empowerment. In this context, PHP serves as a strategic frontliner in health education and therapy monitoring. Pharmacists act not only as medication providers but also as facilitators of behavioral change through counseling, lifestyle training, and patient self-monitoring [6]. This role is increasingly relevant in workplace settings such as UIN Jakarta, where access to health services is limited and prediabetes risk is high. [27,28,29]

However, studies on the effectiveness of self-care interventions facilitated by public health pharmacy in the work environment are still limited, especially those that integrate classical approaches such as Avicenna's health theory with digital technologies such as *WhatsApp*. Therefore, this study aims to evaluate the impact of an eight-week self-care training intervention on clinical parameters and self-care practices in UIN employees.

Methods

Research Design

This study used a quasi-experimental approach with a pretest-posttest design without a control group. This design was chosen due to operational limitations in

providing a comparable and voluntary control group. The aim of this design was to evaluate the effectiveness of basic self-care training interventions versus changes in living and clinical practice for prediabetes. The research design and sampling chart based on inclusion and exclusion criteria can be seen in [figure 1](#). (Research design diagram and its components).

Population and Sample

The population in this study is all employees of UIN Jakarta who meet the prediabetes criteria based on the results of the initial screening. A sample of 93 respondents was selected for purposive sampling, but only 39 respondents actively participated in the entire intervention series (inclusive criteria) and provided complete data on pre- and post-test. Inclusive criteria include:

1. Employees with prediabetes screening results, 2. Declare yourself in Informed Consent to participate in the 8-week program. 3. Actively participate in daily discussion and monitoring forums, 4. Fill in the complete pretest and posttest survey results

Intervention

The intervention program lasted for 8 weeks, facilitated by public health pharmacists and health educators. Interventions include: Education on self-care concepts and Avicenna's classic health theory, Healthy lifestyle training: ketogenic diet, intermittent fasting, breathing techniques, and relaxation, Weekly face-to-face and online sessions (60–150 minutes duration), Daily

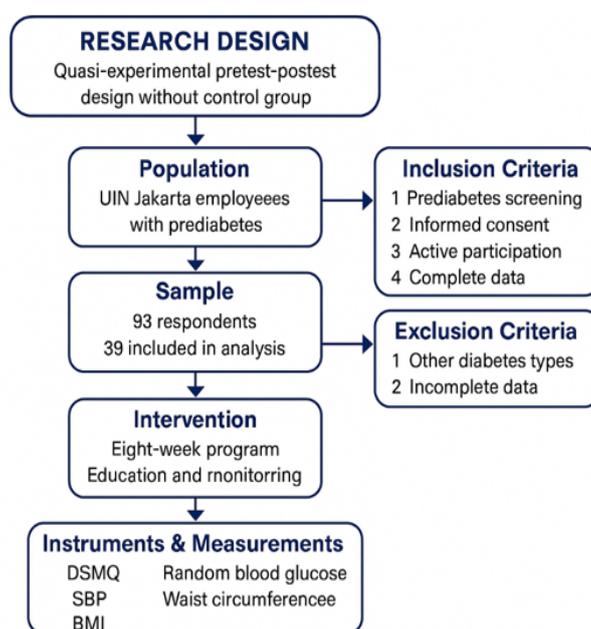


Figure 1. Research design flowchart.

monitoring via *WhatsApp* groups, including counselling and evaluation of self-care practices. Ethical approval was obtained from the Ethics Committee of UIN Syarif Hidayatullah Jakarta (Approval No.Un.01/F.10/KP.01.1/KE.SP/10.08.004/2024).

Instruments & Measurements

Self-care practices were measured using a standardized questionnaire that included aspects of diet, physical activity, stress management, and medication adherence in the DSMQ tool, instruments whose clinical parameters also included: *Random Blood Glucose* (RBG), *Systolic Blood Pressure* (SBP), *Waist Circumference* (WC), *Body Mass Index* (BMI). SBP measured using Omron HEM-8712 (Japan); BMI calculated from weight/height using manual calculation method, RBG assessed with Accu-Chek Performa (Germany); self-care practices evaluated using DSMQ Indonesian version.

The Diabetes Self-Management Questionnaire (DSMQ) tool is used to measure self-care practices, which include aspects of diet, physical activity, stress management, and medication adherence. The Indonesian version of the DSMQ has gone through an adaptation and validation process, demonstrating the validity of the questionnaire as strong and high reliability in the context of type 2 diabetes patients in primary care. Therefore, this tool is suitable for use in the study population. Validity and reliability of prediabetes DSMQ, total Cronbach $\alpha = 0.81$. The mean subscale $\alpha > 0.70$ favors the stability of the instrument, [22,24].

Data Analysis

Data were analyzed using a non-parametric statistical approach because most of the variables showed abnormal distributions (Shapiro-Wilk test results, $p < 0.05$). A comparison between pretest and posttest scores was made using the Wilcoxon Signed-Rank Test. The effect strength measure was calculated using Cohen's d_z , with the interpretation: Small effect: $d_z \approx 0.2$, Medium effect: $d_z \approx 0.5$, Large effect: $d_z \geq 0.8$, [25].

The analysis was carried out using the latest version of SPSS statistical software. Results are presented in the form of tables, graphs, and clinical interpretations to support the validity of the findings.

Data analyzed using Shapiro-Wilk showed most of the variables before and after, abnormal ($p < 0.05$), including: Pretest Glucose (0.001), Posttest Blood Glucose (0.001). Body weight pretest/last, Waist Circumference pretest/last, BMI pretest/other, DSMQ Beginning/end, $p < 0.05$ each. only the SPO2 pretest/prism is close to

the normal range ($p > 0.05$), but not the primary variable. Natural differences are tested before and after the Shapiro-Wilk difference. Most variables pass the assumption of normality, so a pre-dimensional comparison is made with the Wilcoxon Signed rating test. The effect size was reported as Cohen's d_z and 95% CI, [25].

Result and Discussion

Outcomes of Interventions on Clinical and Self-Care Parameters

Based on [table 1](#), sociodemographic characteristics show a significant prediabetes risk profile. The majority of respondents were men (68.8%), who according to the literature have a higher prevalence of central obesity and insulin resistance than women. The average age of respondents was 46.4 years, with the dominance of the 40–59 age group (82.8%), which is a critical age range in the development of metabolic disorders. Most respondents had higher education (97.8%), but this was not always directly proportional to optimal self-care practices. In the context of work, the majority of respondents are administrative staff and lecturers, who tend to have a sedentary lifestyle and high work pressure. Most live in urban areas (92.5%), which are generally associated with a high-calorie diet and low physical activity.

The prevalence of clinical risk as shown in [table 1](#) can be explained in graph 2 of the changes that occurred, central obesity was very high (95.7%), with most respondents having a body mass index (BMI) ≥ 23 , in accordance with the prediabetes risk criteria for the Asian population. As many as 38.7% of respondents had a history of hypertension, which is an important comorbid in the development of type 2 diabetes. Most respondents (77.4%) regularly consume foods high in refined and sugary carbohydrates, which contribute to metabolic risk. Physical activity is still low, with only 17.2% of respondents exercising ≥ 3 times per week, and 69.9% never doing breathing exercises as part of stress management and physiological balance.

Of the 93 primary respondents, up to 39 respondents provided complete data and actively participated in the intervention, the following is a summary of the mean, differences, and double-ttest scores ($N = 39$ pairs).

Based on [table 2](#) states, with the Shapiro-Wilk test of pre, post, and difference values (post – pre), the differential normal rate test for all variables shows an abnormal distribution (Shapiro-wilk $p < 0.05$), so the Wilcoxon test is used for before and after comparison. The primary results of the double test ($n = 39$ complete pairs), the test

Table 1. Sociodemographic characteristics and clinical risk factors of respondents.

Category	Percentage (%)
Gender – Male	68.8
Gender – Female	31.2
Age 40–59 years old	82.8
Other ages	17.2
Higher Education (S1/S2/S3)	97.8
Secondary Education	2.2
Job – Leader	9.7
Occupation – Lecturer	33.3
Occupation – Staff	54.8
Job – Honorary	2.2
Residence – Urban	92.5
Where to Stay – Rural	7.5
Central Obesity	95.7
BMI \geq 23	100.0
History of Hypertension	38.7
High Carbohydrate Consumption	77.4
Exercise \geq 3x/week	17.2
Never Breathe	69.9
Good Knowledge of Prediabetes	7.5

was selected based on the normality of the difference, the effect size was reported as cohen dz : Random blood glucose: Wilcoxon, mean difference +9.41 mg/dL, mean difference, interval [-10.05,-28.87], $p = 0.671$, $dz = 0.152$. Systolic blood pressure (SBP): Wilcoxon, mean difference -5.90 mmHg, 95% confidence interval [-9.39,-2.40], $p = 0.002$, $dz = 0.530$. Weight (WB): Wilcoxon, mean difference -1.80 kg, 95% difference interval [-3.81, 0.22], $p = 0.001$, $dz = 0.279$. Waist circumference (WC): Wilcoxon, mean difference -2.87 cm, 95% difference interval [-5.69, -0.60], probability value = 0.015, $dz=0.320$. BMI : Wilcoxon, mean difference -0.66 kg/, 95% difference interval [-5.69, -0.06], probability value = 0.015, $dz = 0.320$. DSMQ score: Wilcoxon, mean difference +4.15.95% CI [2.51.580],

$p < 0.001$, $dz = 0.793$.

The bottom line is that there was a significant improvement in SBP, WB, BMI and DSMQ, while blood glucose did not change significantly in short-term follow-up. DSMQ (Overall Score), Before: 14.23 Function: 18.38 +4.15 ($p \sim 7.35x$), interprets the above data for a noticeable improvement in self-management behavior. Based on the results of the analysis given in [table 2](#), there was a significant increase in various respondents' health indicators. Random changes in blood sugar levels from 112.54 + 25.98 114.26 + 25.43 mg/dl did not show significant changes to normal blood glucose fasting of 74-109 mg/dl) and RBG (<200 mg/dl) as set by the Ministry of Health of the Republic of Indonesia and the American Diabetes Association's blood

Table 2. A normal (Shapiro-Welk) state table of before, post, and difference (post-before) values..

Parameters	Pre-X	Post – X	Difference (Pre-Post)	Change (%)	P (Conjugated test)
SBP (mmHg)	130.28	124.38	-5.90	- 4.53	0.0021
RGB (mg/dL)	112.54	121.95	+9,41	+1.53	0.6710
Weight (kg)	71.68	69.88	-1.79	- 2.50	0.0891
Waist Circumference (cm)	98.90	96.03	-2.87	- 2.90	0.0526
BMI (kg/m ²)	27.22	26.56	-0.66	-2.44	0.1225
DSMQ	14.23	18.38	+4.15	29.19	0.000015

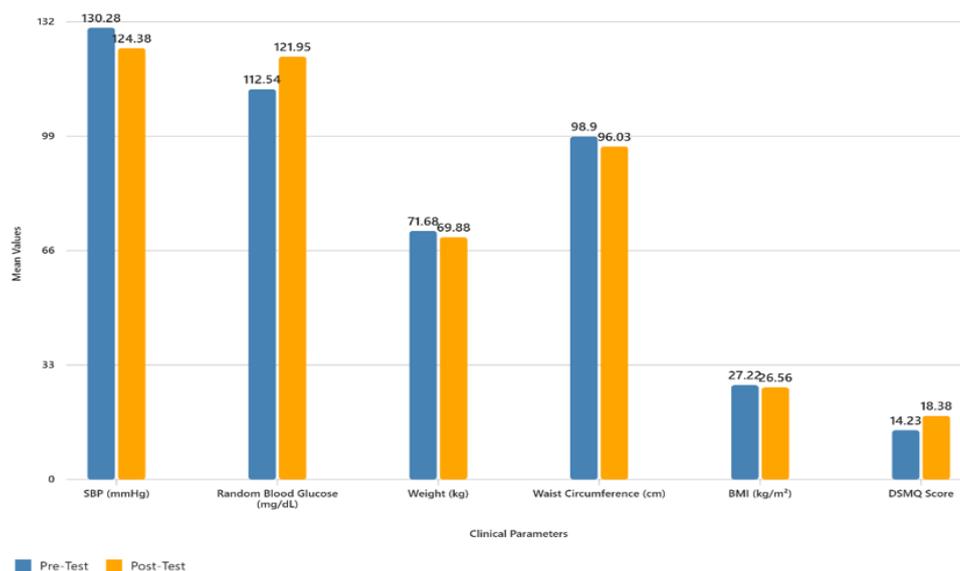


Figure 2. Visualization graph from Table 2 showing changes in clinical parameters before and after intervention in prediabetes patients.

sugar control targets (ADA) in accordance with ADA, [2]. Including hba1c <7%, Fasting Blood Glucose of 80–130 mg/dl, and blood sugar after two hours <180 mg/dl, with adjustments based on age, comorbidities, and risk of hypoglycemia, [1] emphasize that glycemic control can be achieved through a balanced diet, regular physical activity, and regular monitoring, but the likelihood of change is affected by great variability between individuals. Systolic blood pressure dropped from 130.28 mmHg, moving from the pre-hypertension category to near-normal values <124.38 mmHg, according to the classification, [4]. The respondents' waist circumference decreased from 98.90

cm to 96.03 cm, which was in the safe range for men (<90-101 cm) and women (<80-89 cm), indicating a lower risk of metabolic disease, [5]. Body mass index (BMI) also showed an increase from the category of mild obesity (27.22) to overweight (26.56), close to normal (18.5-24.9) as defined in, [3.6]. Finally, the score of self-care practice increased by 36.4 points on a scale from 0 to 160, reflecting the success of educational and behavioral interventions in improving self-efficacy and independent management of diabetes [7].

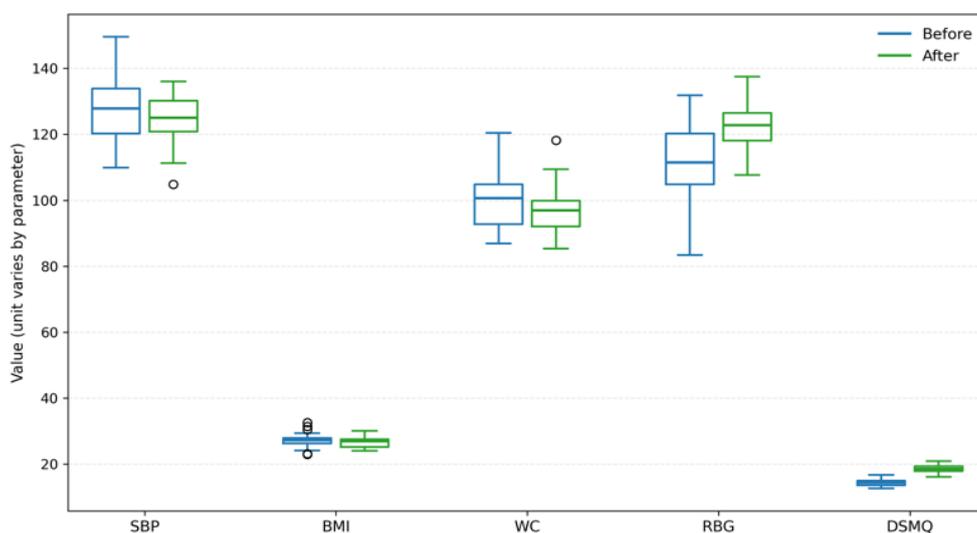


Figure 3. Chart of clinical parameter change boxes before and after intervention.

Table 3. Changes in clinical parameters (post-previous).

ParameterS	N	Test	Difference \bar{X}	95% CI	P value	Cohen Dz	Information
SBP (mmHg)	39	Wilcoxon	5.90	2.40-9.39	0,002	-0.530	Significant decrease in moderate effects
Weight (kg)	39	Wilcoxon	1,79	0.22-3.81	0.001	-0.279	Big drop, small impact
Abdominal circumference (cm)	39	Wilcoxon	2.87	0.06-5.68	0.015	-0.320	Big drop, small impact
BMI (kg/m ²)	39	Wilcoxon	0.66	0.16-1.49	0.003	-0.253	Big drop, small impact
DSMQ	39	Wilcoxon	4.15	5.80-2.51	0.001	+0.793	Big improvement, big effect
Random GB (mg/dL)	39	Wilcoxon	9.41	28.87-10.05	0.671	+0.152	Insignificant

Statistical Analysis and Alinical Implications

These findings can also be compared to the study by Liu et al. (21) which showed that psychological interventions were able to significantly improve glycemic control. The validity of the Indonesian version of DSMQ in this study is supported by the results of Azmiardi's study (22), which shows high reliability in the context of primary services. In addition, Cornelius A, (23) affirms that self-efficacy is an important component in diabetes management, which is relevant to the educational and monitoring approaches used in this study. [23,26]

Based on Figure 3 states, the box changes clinical parameters before and after the intervention. The 8-week intervention program is facilitated by public health pharmacy, and includes education on self-care conception, Avicenna health theory, ketogenic diet, intermittent fasting, breathing techniques, structured physical activity, and relaxation. Sessions are conducted face-to-face and online, as well as daily monitoring through whatsapp.

Statistical analysis of the six clinical parameters in table 3 showed that five of the six parameters experienced statistically significant changes after the intervention ($p < 0.05$). The greatest effect was demonstrated by the DSMQ score (Cohen's $d_z = +0.793$), indicating a strong improvement in self-care practices. SBP (mmHg) showed moderate effects ($d_z = -0.530$), while body weight, abdominal circumference, and BMI showed a small but significant effect. Random GB (mg/dl) showed no significant change ($p = 0.671$, $d_z = + 0.152$). The clinical implications of these results suggest that self-care-based training interventions are effective in improving self-efficacy, lowering blood pressure, improving body composition, and reducing the risk of metabolic diseases. The active role of public health pharmacists in education

and daily monitoring is a key factor in the success of this program, [23,26].

Based on visual analysis through a box chart, it was observed that there was a shift in the mean and a narrowing of the interquartile range in most of the variables after the intervention was performed. This suggests that the intervention performed did not appear to have any effect on the decrease in mean values, but that the results of random GB with a difference of ≈ 0 mg/dl, $p = 0.671$ (Wilcoxon), were not significant \rightarrow productivity confirming the main conclusion that random GB did not change in the short term. [25]

On the current blood sugar (RGB) variable, the mean post-intervention score did not change significantly compared to the pretest, with a more consistent distribution among participants. These findings support the effectiveness of interventions in controlling blood glucose, which is in line with the results of a study conducted by Israfil (7), which shows that interventions such as physical exercise and relaxation are able to significantly lower blood glucose levels, [8].

Furthermore, in the variable body mass index (BMI), there was a decrease in the average and narrowing of the distribution of data. This decrease suggests that the intervention was equally successful in losing weight among the participants. Studies by Anderson and Thompson (10) show that a low-carb diet approach and healthy lifestyle (20) can consistently lose weight in the adult population, [9,20].

The abdominal circumference variable also showed a decrease in the medium and narrow data ranges, indicating an increase in body fat distribution. A decrease in abdominal circumference is very important because it is an indicator of abdominal obesity that is closely

related to metabolic risks such as diabetes and high blood pressure. His research [10] determined that abdominal circumference ≥ 80 cm in women and ≥ 90 cm in men was the breaking point for metabolic disease risk, [10].

Statistical Analysis of Changes in Clinical Parameters (pre-post test)

The results of this study can be compared with a study by Kim et al.(10), which showed that intensive lifestyle modifications were able to significantly reduce blood glucose levels and obesity indicators. However, in this study, blood glucose levels did not change significantly, likely due to the shorter duration of the intervention and the digital education approach. In addition, Pranata et al,(11). report that personalized interventions in Indonesia are effective in lowering blood glucose levels, suggesting that community-based approaches like those in this study need to be further developed to achieve comparable outcomes.

Based on table 3 stated, changes in clinical parameters (post-previous), the highest effect was found on an increase in DSMQ (*self-care*) scores. Random blood glucose showed no significant changes, likely affected by large variability between individuals.

Meanwhile, DMSQ and DMSQ1 scores measuring self-care practices showed a moderate improvement, although the data distribution remained broad. This shows that most participants saw an improvement in self-care practices, but with significant variation in the application of health education. A study by Balgis et al. (10) confirms that although health education can improve self-care scores, its success is strongly influenced by individualized and contextual approaches. [11]

Overall, *the results of the box chart showed* that the intervention succeeded in lowering physiological values such as RGB, body mass index and abdominal

circumference, as well as increasing consistency among respondents. However, the increase in self-care scores accompanied by a wide distribution emphasizes the need for a more personalized approach tailored to the characteristics of the participants. Figure 3 shows *the box plot* for SBP, BMI, waist circumference, RGB, and DSMQ. Box = interquartile range (IQR), midline = median, whiskers = minimum-maximum range. Median shifts and narrowing of IQR after intervention showed consistent improvement in health. SBP, BMI, waist circumference, and DSMQ show significant changes; RGB is insignificant.

Improved Levels of Self-Care Practices Before and After Interventions, with DSMQ Score Analysis

Based on table 4, a comparison of before and after scores in five DSMQ scales. Analysis of pre- and post-intermediate scores on five subscales of the Diabetes Self-Management Questionnaire (DSMQ) showed different trends of change. The glucose management subscale decreased slightly from 3.06 to 2.89 ($\Delta = -0.17$), which was statistically insignificant ($p > 0.05$; t-test = 0.03; Wilcoxon = 0.30). A similar decrease occurred in the dietary controls, from 3.03 to 2.80 ($\Delta = -0.23$), with p-values close to importance but still above the threshold (0.17-0.11). In contrast, physical activity showed a slight increase from 2.99 to 3.06 ($\Delta = + 0.07$), and healthcare increased significantly from 2.93 to 3.14 ($\Delta = + 0.21$), although neither was statistically significant ($p \geq 0.30$). The Evidence and Statistics Score for behavior change (DSMQ) overall decreased from 3.13 to 2.85 ($\Delta = -0.28$), with a $p \geq$ value of 0.34, suggesting that the intervention was not intensive or long enough to bring about meaningful changes in patients' self-management practices, [25].

These results are in line with the Hungarian version of the DSMQ validation study by [12], which showed a

Table 4. Comparison of before and after scores on the five DSMQ subscales.

DSMQ Subscale	Pre X Score	Post X Score	Delta	P value t-test	Wilcoxon's p value	Interpreta-tion
Glucose Management	3.06	2.89	-0.17	0.33	0.30	Slight decrease, insignificant
Diet Control	3.03	2.80	-0.23	0.17	0.11	Mild decline in the border trend
Physical Activity	2.99	3.06	+0.07	0.75	0.81	Slight improvement, insignificant
Healthcare Usage	2.93	3.14	+0.21	0.30	0.34	Moderate increase, insignificant
Overall self-care score	3.13	2.85	-0.28	0.37	0.34	Overall decline, insignificant

statistically significant negative correlation between total DSMQ scores and HbA1c levels ($p = -0.253$, $p < 0.01$), as well as between physical activity and BMI subscales ($p = -0.219$, $p < 0.01$). This study confirms that the DSMQ has validity in a cross-sectional context, but is not necessarily sensitive in detecting changes due to short-term interventions, [12,22,24].

Interpretation of DSMQ Subscale Changes (Figure 4)

The radar chart provides a visual comparison of pre- and post-intervention scores across five DSMQ subscales: Glucose Management, Diet Control, Physical Activity, Healthcare Usage, and Overall Self-Care. The blue polygon represents pre-intervention scores, while the orange polygon illustrates post-intervention scores.

Qualitative Insights (Table 5): The radar chart aligns with qualitative interpretations, where glucose and diet management regressed, while physical activity and healthcare usage improved slightly. These findings suggest that short-term interventions may not uniformly influence all behavioral dimensions, reinforcing the recommendation to adopt DSMQ-R for better sensitivity and to implement longer, more intensive programs with psychosocial support.

In contrast, the revised version of the DSMQ (DSMQ-R) showed good intrinsic reliability ($\alpha = 0.810$) and a significant response to short- to medium-term behavioral change, especially in the context of early practice [13]. This suggests that the DSMQ-R is more adaptive to the patient's behavioral dynamics and may be a more sensitive alternative in intervention studies.

In the Indonesian context, although the DSMQ is not used directly, a study by [14] showed that self-management education interventions have a significant impact on the eating habits, physical activity, and obesity status of people with type 2 diabetes ($p < 0.05$), [13]. These results support

that self-management interventions can be effective, but require sufficient intensity and duration to statistically detect behavioural changes.

Overall, the results of this analysis confirm two important points: first, the strategic analysis of self-management is a valid and responsive tool to the state of self-management; Therefore, to improve the effectiveness of the intervention, it is recommended to use the DSMQ-R and implement a more intensive and continuous learning strategy.

The statistical results based on table 5 above compare pre-mean and post-average scores on five scales of self-questionnaire for diabetes management (DMSQ), glucose management, diet control, physical activity, health care, and numerical scales, which show differences in scores on each scale after intervention and training.

Glucose management high initial scores in the field of glucose management indicated that participants had good habits in monitoring blood sugar levels, using insulin or oral medications consistently, and responding to symptoms of hypoglycemia or hyperglycemia. However, the decline in post-intervention scores suggests a decline in this practice. This can be caused by several factors, such as fatigue in undergoing a diabetes management routine, lack of social support, or changes in psychological conditions such as stress or mild depression that affect medication adherence [15,21]. This reduction should be followed up with more intensive educational and psychosocial approaches, such as motivational counseling or family involvement in the treatment process [21].

Diet control A high score at baseline indicates that the patient is quite disciplined in choosing foods that are in accordance with the diabetic's dietary recommendations, such as avoiding simple carbohydrates, paying attention to the glycemic index, and maintaining a regular diet. Subsequent declines in values may indicate a decline in eating habits, perhaps due to a lack of diversity

Table 5. Qualitative interpretation of DSMQ subscale change.

DSMQ Subscale	Initial score level	Post-Intervention Trends	Qualitative Interpretation
Glucose Management	Tall	Lower	Decreased adherence to glucose cotrols
Diet Control	Tall	Lower	Regression in the discipline of diet
Physical Activity	Moderator	Slightly higher	Small increase in Activity level
Healthcare use	Tall	Slightly higher	Increased engagement with Healthcare
Overall self-care score	Tall	Lower	A general decrease in self-care consistency

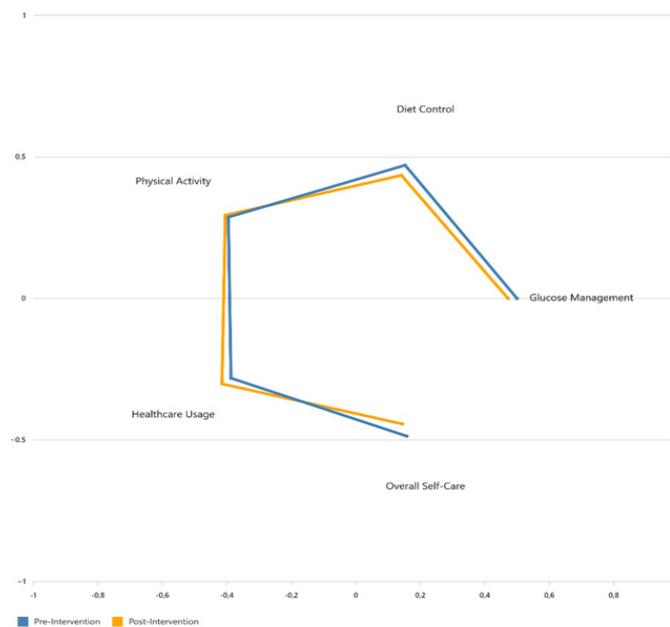


Figure 4. Radar chart ,DSMQ subscale changes and behavioral trends.

of healthy foods, saturation with a strict diet, or the impact of an unfavorable social environment [15]. This decline highlights the importance of a more flexible and sustainable approach to dieting, for example through meal planning based on patient preferences or fun healthy cooking training.

The early degree of moderate indicates that the patient is engaging in physical activity with sufficient intensity and frequency, although it is not yet ideal. A slight decline can then be caused by external factors such as weather, busy work, or deteriorating physical conditions. Although this decrease is not drastic, it is still worth noting that physical activity plays an important role in improving insulin sensitivity and weight maintenance [16,20]. Community interventions such as gymnastics or diabetes walking groups can be a solution to maintain motivation and consistency of physical activity.

A high level of healthcare initially indicates that patients are active in scheduling visits to healthcare facilities, consulting with medical staff, and following clinical recommendations. A slight decrease may reflect access restrictions, such as distance to healthcare facilities, costs, or changes in work schedules. This can also occur due to the perception that conditions have improved so that visits are considered unnecessary education about the importance of regular monitoring and early detection of complications should be promoted so that patients remain engaged in long-term care [16,17].

The overall DMSQ score decline indicates that there

is a decline in the quality of diabetes self-management. While not all domains have experienced a sharp decline, this trend suggests the need to re-evaluate the intervention strategies used. The approach applied may not take into account the psychological aspects [23,24], social, or cultural aspects of the patient [26]. An interdisciplinary approach involving diabetes educators, psychologists, nutritionists, and primary health workers is highly recommended to restore and improve DMSQ scores across the board [17].

Research Novelty: This study combines the classical approach of Avicenna's theory with modern digital interventions through WhatsApp and monitoring by community pharmacy. This approach has not been extensively explored in previous prediabetes studies and offers an inexpensive and effective culture-based prevention model.

Design validity and sensitivity analysis

Initial and posttest test designs without control groups have limitations in causal inference, but remain relevant in community studies and exploration. The study qualified for internal validity through the use of standardized instruments (DSMQ), precise statistical testing (Wilcoxon) [25], and impact size reporting (Cohen's d_z). Sensitivity analysis was carried out by evaluating the influence of (external) data on RGB variables. Although the post-test RGB value was high, the results remained insignificant ($p = 0.671$), suggesting that the conclusions were not based on one or two outlier data. This increases the robustness of the analysis and the validity of the research results, [25].

In addition, this intervention aligns with the principles of Diabetes Self-Management Education and Support (DSMES) as recommended by the American Diabetes Association (ADA) 2025. DSMES emphasizes structured education, ongoing behavioral support, and person-centered care to improve self-efficacy and glycemic outcomes [30,31]. The integration of WhatsApp-based digital education in this study represents an innovative adaptation of DSMES in a workplace setting, offering a cost-effective and culturally relevant model. Future programs should strengthen DSMES components such as goal-setting, problem-solving, and continuous feedback to optimize long-term metabolic control, [23,26].

Conclusion

The results showed that an eight-week self-care intervention facilitated by public health pharmacy had a positive effect on improving self-care practices and improving clinical parameters for prediabetes. There was a significant decrease in systolic blood pressure, body mass index (BMI), and waist circumference, as well as an increase in DSMQ scores indicating better self-efficacy. Validity of the Indonesian version of the DSMQ tool tested, as well as the use of statistical analysis Wilcoxon and impact scale Cohen's dz, improving the quantitative interpretation of the results. Although some subscales of the DSMQ do not show significant changes, positive trends are still visible, and this is in line with the literature suggesting the use of the DSMQ-R for short-term intervention studies. A culture-based educational approach through Avicenna's health theory and the use of digital media such as WhatsApp has been shown to increase participant engagement and program effectiveness. These interventions provide a low-cost, adaptable, community-based prevention model that is worthy of further development on a larger scale, [23,25,26].

Conflict of Interest

The authors declare no conflict of interest regarding the publication of this article.

Ethical Considerations

This study was approved by the Ethics Committee of UIN Syarif Hidayatullah Jakarta (Approval No. Un.01/F.10/KP.01.1/KE.SP/10.08.004/2024). All participants provided written informed consent prior to inclusion in the study.

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