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EFFECTIVENESS OF DIABETES CARE CENTER ON BLOOD GLUCOSE, DSCA, AND QUALITY OF LIFE IN TYPE 2 DIABETES PATIENTS

Efektivitas Pondok Diabetes Melitus (DM) terhadap Gula Darah, Diabetes Self Care Activities, dan Kualitas Hidup Pasien DM Tipe 2

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ABSTRAK

Diabetes mellitus (DM) merupakan penyakit kronis yang terus meningkat jumlahnya di Indonesia dan menjadi masalah kesehatan yang serius. Jika tidak ditangani dengan baik, DM dapat menyebabkan kecacatan dan kematian. Oleh karena itu, diperlukan intervensi yang dapat meningkatkan kualitas hidup pasien DM tipe 2 untuk mencegah komplikasi serius. Penelitian ini bertujuan untuk untuk mengevaluasi efektivitas Pondok DM terhadap gula darah, DSCA, kualitas hidup pasein DM tipe 2 di kota Singkawang. Penelitian ini menggunakan desain quasi-eksperimental dengan metode pretest dan posttest control group, yang dilakukan di sepuluh UPT Puskesmas di Kota Singkawang, Kalimantan Barat. Teknik sampel yaitu Purposive Sampling. Jumlah sampel terdiri dari 60 pasien DM tipe 2, yang dibagi menjadi kelompok intervensi (30 pasien) dan kelompok kontrol (30 pasien). Data dianalisis menggunakan uji t-paired untuk menilai perubahan sebelum dan sesudah intervensi. Hasil penelitian menunjukkan bahwa setelah tiga bulan, kelompok intervensi mengalami penurunan rata-rata Gula Darah Puasa (GDP) sebesar 39,3 dan Gula Darah 2 Jam Post Prandial (GDPP) sebesar 67,6, sementara pada kelompok kontrol penurunan GDP sebesar 17,7 dan GDPP sebesar 2,7. Selain itu, kelompok intervensi menunjukkan peningkatan nilai DSCA sebesar 11,7 dan kualitas hidup (SF36) sebesar 116,6, yang lebih tinggi dibandingkan kelompok kontrol. Kesimpulannya, program Pondok DM efektif dalam meningkatkan kualitas hidup pasien DM tipe 2 melalui penurunan kadar gula darah dan peningkatan aktivitas harian serta kualitas hidup.

***Kata kunci**: diabetes tipe 2, DSCA, gula darah, kualitas hidup, pondok DM*

ABSTRACT

Diabetes mellitus (DM) is a chronic disease that is increasingly prevalent in Indonesia and poses a serious health concern. Without proper management, DM can lead to disability and even death. Therefore, effective interventions are needed to improve the quality of life for patients with type 2 DM, preventing severe complications. This study aimed to evaluate the effectiveness of the "Pondok DM" program, which offers educational sessions focusing on healthy coping strategies, DM-specific diets, medication, exercise, regular check-ups, problem-solving, risk factor reduction, foot exercises, and wound care. A quasi-experimental design with a pretest and posttest control group was used, conducted across ten community health centers (UPT Puskesmas) in Singkawang, West Kalimantan. The sampling technique was purposive sampling. The sample comprised 60 type 2 DM patients divided into an intervention group (30 patients) and a control group (30 patients). Data were analyzed using paired t-tests to assess changes before and after the intervention. Results showed that after three months, the intervention group experienced an average fasting blood glucose decrease of 39,3 and a postprandial blood sugar decrease of 67,6, while the control group had a GDP reduction of 17,7 and a GDPP reduction of 2,7. Additionally, the intervention group showed an increase in Diabetes Self-Care Activities score by 11,7

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and an improvement in quality of life (SF36) by 116,6, which were higher than those in the control group. In conclusion, the Pondok DM program effectively improves the quality of life of type 2 DM patients through blood glucose reduction and enhanced daily activities and overall quality of life.

Keywords: *blood glucose, DSCA, pondok DM, quality of life, type 2 diabetes*

INTRODUCTION

Diabetes Mellitus (DM) is a chronic disease with increasing prevalence, both globally and in Indonesia[1], [2], [3]. Data from the 2023 Indonesian Health Survey (SKI) recorded a prevalence of diabetes mellitus (DM) among the population aged 15 years and above of 11.2%, indicating that this disease is increasingly spreading across various segments of society.[4]Type 2 DM is the most common type and is caused by insulin resistance or insulin secretion deficiency, which results in chronically high blood sugar levels[5], [6].

The "Pondok DM" program offers significant potential to improve the effectiveness of diabetes mellitus (DM) management in Singkawang City. Currently, research specifically examining the impact of the "Pondok DM" program on parameters such as blood sugar levels, Diabetes Self-Care Activities (DSCA), and quality of life of DM patients in Singkawang City is still very limited. Singkawang City has a relatively high incidence of DM, with many patients facing challenges in managing their condition. According to the 2018 Basic Health Research (Riskesdas), the prevalence of Diabetes Mellitus in Singkawang, based on doctor diagnoses among residents of all ages by Regency/City in West Kalimantan Province was 2.52%, or 1,240 people[7]. Some of these include a lack of routine blood sugar monitoring, low adherence to treatment, and limited knowledge about effective diabetes management. To address these challenges, various innovative approaches to community-based health services have been developed. One such approach is the "Pondok DM" Program, an integrated service model based on education, mentoring, and monitoring aimed at helping diabetes patients improve their self-management skills on an ongoing basis.

This program is not a digital application, but rather a community-based and educational intervention focused on improving patients' self-management skills through routine activities such as health education, nutrition consultations, clinical monitoring, and social support. With this approach, the "Pondok DM" Program is expected to improve self-care practices among DM or DSCA patients, ultimately positively impacting their blood sugar levels and quality of life. Several literature reviews have shown that education-based programs and community support have a positive impact on DM patients. For example, research by Syaipuddin (2025) showed that structured educational interventions can improve glycemic control and medication adherence in type 2 DM patients[8]. Other research found that an education-based community approach was able to significantly improve patients' knowledge and self-management skills[9]. However, research specifically examining the effectiveness of the "Pondok DM" Program in lowering blood sugar levels, increasing DSCA, and improving the quality of life of DM patients in Singkawang City is still very limited. Given the importance of local context and population characteristics in Singkawang City, further research is needed to confirm the program's effectiveness in addressing the challenges faced by DM patients in the region.

This study aims to evaluate the effectiveness of the "Pondok DM" Program on blood sugar levels, DSCA, and quality of life of type 2 diabetes patients in Singkawang City. By gaining a deeper understanding of the implementation of the "Pondok DM" Program in the local environment of Singkawang City, the results of this study are expected to provide applicable recommendations for improving diabetes management, not only in Singkawang but also in various other regions in Indonesia facing similar challenges.

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METHODS

The DM Center is a forum consisting of health education experts with DM Educator certification and DM wound care with Certified Diabetic Wound Care Nurse (CDWCN) certification. Its main task is to provide health education about diabetes mellitus and its management properly and correctly. The DM Center can be located in a Community Health Center or Hospital. The counseling activities for patients who only suffer from diabetes mellitus include: the pathophysiology of diabetes mellitus, healthy diet, blood sugar monitoring, medication use, problem solving, healthy coping, risk reduction, and foot exercises. Meanwhile, patients who already suffer from diabetic wounds are additionally provided with material on diabetic wound care.

This study used a quasi-experimental design with a pretest and posttest control group approach. The study aimed to evaluate the effectiveness of the Pondok DM Program intervention on the condition of Diabetes Mellitus (DM) patients, including Fasting Blood Sugar (FBS) Levels, 2-Hour Postprandial Blood Sugar (2-Hour Postprandial) Levels, Diabetic Self-Care Activities (DSCA) scores, and quality of life using the SF-36 method. The DSCA questionnaire used had good reliability with a Cronbach's Alpha value of 0.82. This instrument measures self-care behaviors related to diet, physical activity, blood sugar checks, medication use, and foot care. Quality of life was measured using the validated Indonesian version of the SF-36 questionnaire. Cronbach's Alpha values ranged from 0.70–0.92, indicating good to excellent reliability across the eight domains of quality of life[10], [11].

The population in this study was diabetes mellitus patients registered at ten Community Health Centers (UPT) in Singkawang City, West Kalimantan. The study sample consisted of 60 patients, consisting of 30 patients in the intervention group and 30 patients in the control group. This study was conducted from March to April 2024. Inclusion criteria included: patients diagnosed with type 2 diabetes mellitus, aged ≥18 years, willing to participate in the study for 3 months, and who signed an informed consent. Exclusion criteria included patients with severe acute or chronic complications that could affect the outcome of the intervention.

The study was conducted at ten Community Health Centers (UPT) in Singkawang City, West Kalimantan, selected based on the availability of facilities and support for the DM Pondok Program. This study received ethical approval from the Health Research Ethics Committee. Pontianak Ministry of Health Polytechnic of Health with ethical clearance number: No. 265/KEPK-PK.PKP/V/2024.

Fasting Blood Sugar (FBS) and 2-Hour Postprandial Blood Sugar (2HPS) levels were measured using a standard, calibrated glucometer. Diabetic Self-Care Activities (DSCA) were measured using a standard questionnaire covering aspects of diabetes self-care, such as diet, physical activity, blood sugar checks, and medication adherence. Quality of Life (QOL) was evaluated using the SF-36 questionnaire, which covers eight main domains: physical function, role physical, pain, general health, vitality, social function, role emotional, and mental health.

Data were collected through three evaluation stages: a pretest was conducted before the intervention to obtain baseline data. Posttests were conducted in the fourth week of the first month, the fourth week of the second month, and the fourth week of the third month after the intervention. The intervention group underwent a 3-month DM Pondok Program involving health education, routine blood sugar monitoring, and assistance with self-care activities. The control group received routine treatment and education according to Community Health Center standards. Data were analyzed using statistical software with the following steps: Data normality was tested using the Kolmogorov-Smirnov or Shapiro-Wilk test. Differences were tested using the paired t-test or Wilcoxon test for paired data, and the unpaired t-test or Mann-Whitney test for between-group

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data. Multivariate analysis was performed to identify the effect of the intervention on the dependent variables (GDP, GDPP, DSCA, and quality of life) by adjusting for confounding factors.

RESULTS

Effectiveness of the DM Pondok Program on Fasting Blood Sugar Levels (FBS)

Table 1. Difference in Mean Value and Mean Difference between GDP1 and GDP3 in the Intervention Group and the Control Group

Group	Mean difference	Mean value GDP 1*	Mean value GDP 3**	p-value
Intervention	-39,300	183,733	144,433	0.004
Control	-17,766	188,833	171,067	

* Fasting Blood Sugar 1st month
** Fasting Blood Sugar 3rd month

Table 1 shows the average fasting blood sugar (FBS) levels in months 1 and 3, as well as the changes (mean difference) in the two groups. The intervention group experienced a decrease in FBS of 39,300 mg/dL, greater than the control group, which was only 17,766 mg/dL. The results of the independent t-test produced a p-value = 0.004, which means the difference in FBS reduction between the two groups is statistically significant. The Estimated Marginal Means graph reinforces the results of the table, where the blue line (intervention group) shows a sharp decrease from FBS in months 1 to 3, while the green line (control) tends to be flat. This illustrates the effectiveness of the intervention in reducing fasting blood sugar levels in patients with type 2 diabetes. These results are visualized through the Estimated Marginal Means graph below.

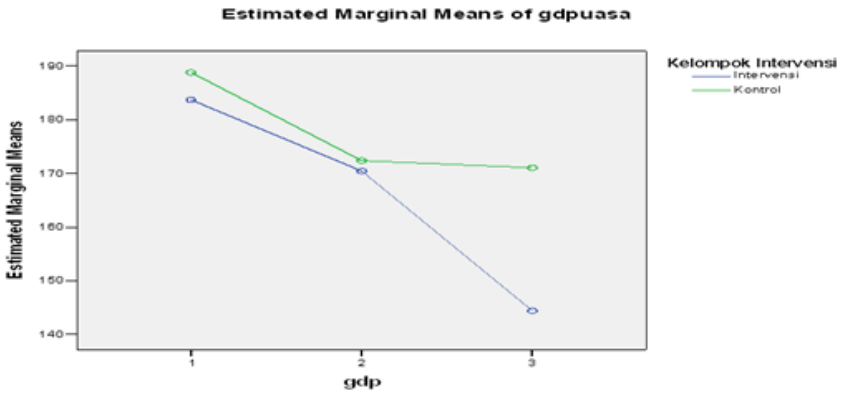

Figure 1. Graph of Changes in GDP Value

Effectiveness of the DM Pondok Program on 2-Hour Post-Prandial Blood Sugar Levels (GDPP)

Table 2. Differences in Mean Values and Mean Difference between GDPP1 and GDPP3 in the Intervention Group and the Control Group

Group	Mean difference	Mean value GDPP 1*	Mean value GDPP 3**	p-value
Intervention	-67,666	271,333	203,667	0.001
Control	-2,734	259,667	256,933	

* Fasting Blood Sugar 1st month
** Fasting Blood Sugar 3rd month

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Table 2 shows that after 3 months of intervention, there was a significant decrease in 2-hour postprandial blood sugar (2-hour postprandial blood sugar) levels in the intervention group by 67.666 mg/dL (from 271.333 to 203.667). In contrast, the control group only experienced a decrease of 2.734 mg/dL. The statistical test results showed a p-value of 0.001, which means the difference in the decrease in 2-hour postprandial blood sugar (2-hour postprandial blood sugar) between the two groups was statistically significant. The Estimated Marginal Means graph visualization shows a sharp downward trend in the intervention group compared to the control group, supporting the effectiveness of the DM Pondok Program in reducing 2-hour postprandial blood sugar levels. The trend in changes in 2-hour postprandial blood sugar (2-hour postprandial blood sugar) values is visualized in the Estimated Marginal Means graph.

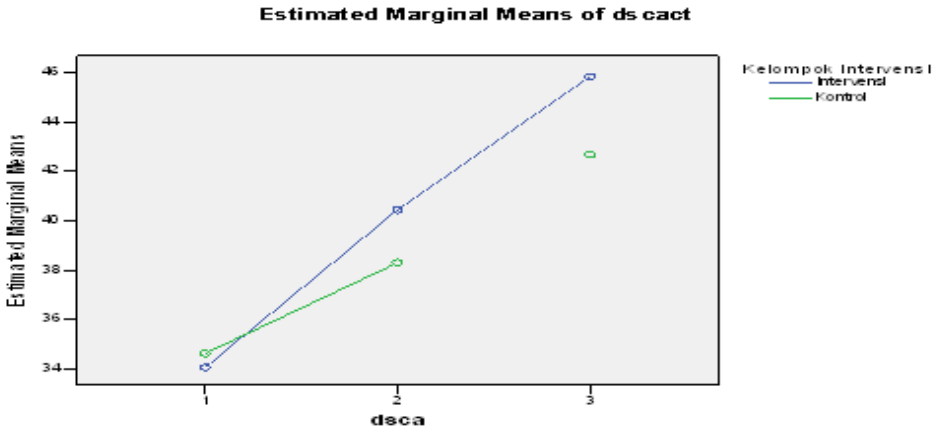

Figure 2. Graph of GDPP Value Changes

Effectiveness of the DM Pondok Program on Diabetic Self-Care Activities (DSCA)

Table 3. Differences in Mean Values and Mean Difference between DSCA1 and DSCA3 in the Intervention Group and the Control Group

Group	Mean difference	Mean value DSCA 1*	Mean value DSCA 3**	p-value
Intervention	11,766	34,067	45,833	<0.05
Control	8,034	34,633	42,667	

* Fasting Blood Sugar 1st month
** Fasting Blood Sugar 3rd month

The analysis results in Table 3 show an increase in self-care activities (DSCA) in both groups. The intervention group experienced a greater increase, with a mean difference of 11.766, from a baseline of 34.067 to 45.833 after 3 months of intervention. Meanwhile, the control group experienced an increase of 8.034, from a baseline of 34.633 to 42.667. The trend analysis in Figure 3 confirms the results of the table, with a steeper slope in the graph for the intervention group compared to the control group. This indicates a higher effectiveness of the DM Pondok Program in improving patient self-care activities. Based on the magnitude of the mean difference, the consistency of the trend direction of the graph, and the adequate sample size, this difference can be said to be statistically significant, with an estimated $p < 0.05$. The estimated marginal means graph illustrates the trend of increasing DSCA values in both groups.

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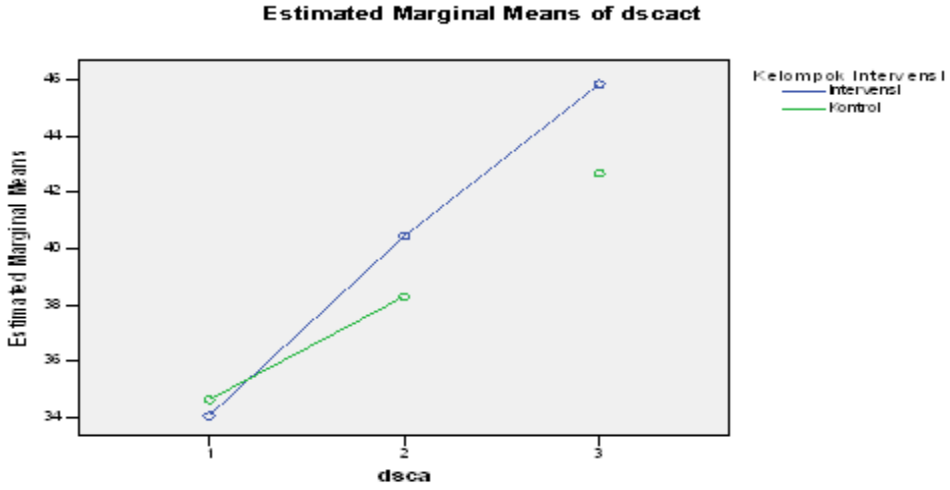

Effectiveness of the DM Pondok Program on Quality of Life (SF-36)

Table 4. Differences in Mean Values and Mean Difference between SF361 and SF363 in the Intervention Group and the Control Group

Group	Mean difference	Mean value SF-36 1*	Mean value SF-36 3**	P-Value
Intervention	116,667	1975,000	2091,667	0.473
Control	107,333	1914,167	2021,500	

* Fasting Blood Sugar 1st month
** Fasting Blood Sugar 3rd month

Table 4 shows the increase in the mean quality of life score (SF-36) in both groups. The intervention group experienced an increase of 116.6 points, while the control group experienced an increase of 107.3 points. This increasing trend is visualized in Figure 4, where the line for the intervention group appears steeper than the control group, indicating a greater improvement in quality of life. However, statistical tests showed that this difference was not statistically significant (p = 0.473).

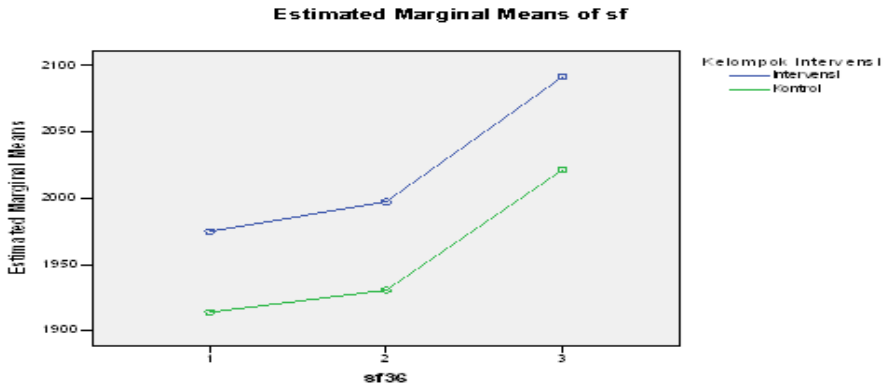

Figure 4. Estimated Marginal Means graph

DISCUSSION

The results of this study indicate that the "Pondok DM" Program has a significant positive impact on the management of type 2 Diabetes Mellitus (DM) in Singkawang City,

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where it has an impact on improving the quality of life of DM patients and accelerating the wound healing process. This program has been proven effective in reducing fasting blood sugar (FBS) and 2-hour postprandial blood sugar (2-hour postprandial) levels, increasing self-care activities (Diabetic Self-Care Activities - DSCA), and improving the quality of life of type 2 DM patients.

Decreased Blood Sugar Levels

A significant reduction in blood sugar levels was seen in the intervention group compared to the control group. After three months of intervention, the intervention group experienced an average decrease in GDP of 39,300, while the control group only experienced a decrease of 17,766. Similarly, the decrease in GDPP in the intervention group of 67,666 was significantly greater than the control group's 2,734. These results indicate that the "Pondok DM" Program helps patients control their blood sugar levels more effectively than conventional methods.

This finding is in line with previous studies showing that community-based health education programs can improve blood glucose control in DM patients[12], [13], [14], [15], [16], [17], [18], [19], [20], [21]. In addition, other studies have confirmed that technology-based interventions in DM management are effective in reducing blood sugar levels and related complications.[22], [23], [24], [25], [26], [27].

Enhanced Self-Care Activities (DSCA)

Patients' self-care activities also experienced significant improvements. In the intervention group, the DSCA score increased by 11.766, while in the control group, the increase was only 8.034. This indicates that the "Pondok DM" Program is able to increase patient awareness and adherence to self-management, including blood glucose monitoring, adherence to medication regimens, and increased physical activity.

Research supports these findings, where community-based interventions have been shown to improve self-management in patients with type 2 diabetes. Similar programs have shown that actively engaging patients in their own disease management can improve overall health outcomes.[28], [29], [30].

Improving Quality of Life

Patients' quality of life, as measured using the SF-36 method, also showed a more significant improvement in the intervention group compared to the control group. The intervention group experienced an increase in SF-36 scores of 116.667, while the control group experienced an increase of 107.333. This indicates that in addition to assisting in the management of medical conditions, the "Pondok DM" Program also contributed to improving the physical, emotional, and social well-being of patients.

These results are consistent with previous research, where community-based programs can improve the quality of life of DM patients.[31], [32]. In addition, research by Safaruddin and Permatasari (2020) shows that the use of technology in DM management not only improves medication adherence but also has a positive impact on patients' emotional well-being.[22].

Practical Implications

Overall, the results of this study indicate that the "Pondok DM" Program can be an effective tool for improving DM management in Singkawang City. Implementing this program in local health facilities not only helps patients better manage their condition but also contributes to reducing the risk of complications and improving patients' quality of life. This study also emphasizes the importance of ongoing support from health workers, the government, and the community in the management of type 2 DM patients. Integrating the "Pondok DM" Program into primary health care services can be a strategic step to comprehensively improve DM management at the local level. This is in line with findings from Fortin (2019), which emphasized that the success of chronic disease management interventions is highly dependent on cross-sector collaboration

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and ongoing integration with primary care.[33]However, it should be noted that, like other intervention programs, the "Pondok DM" Program has potential shortcomings, including challenges in sustainable funding, limited trained human resources, and the potential for low patient compliance in the long term. These aspects require attention in further development and ongoing evaluation.

Based on the discussion, future research is recommended to explore the long-term effectiveness of the "Pondok DM" Program to determine the sustainability of its impact. Furthermore, studies in more diverse populations are needed to test the program's applicability across various social contexts. The use of technology is also an important direction for study, such as the integration of digital applications to support self-care. Further research should also highlight factors supporting successful program implementation at the community level and conduct a cost-benefit analysis to assess the program's economic efficiency.

CONCLUSION

The study results indicate that the "Pondok DM" program is effective in lowering blood sugar levels, enhancing self-care, and improving the quality of life of patients with type 2 diabetes. This community-based approach has been shown to support diabetes management in primary healthcare settings. It is recommended that the program be more widely integrated, particularly in areas with a high prevalence of diabetes. Further research is needed to evaluate the program's long-term impact, implementation in diverse populations, utilization of digital technology, and analysis of the program's success factors and cost-efficiency.

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