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Education on Prevention and Management of Gestational Diabetes of Pregnant Women at the Obstetrics and Gynecology Clinic of *Rumah Sakit Kabupaten Kediri (RSKK)*

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Abstract

Gestational Diabetes Mellitus (GDM) is glucose intolerance that first appears or is detected during pregnancy and can lead to various complications for both the mother and the fetus. Preventing and managing GDM can be achieved through nutrition and physical activity education. This education aimed to enhance the understanding of pregnant women so that they can adopt a healthy lifestyle to prevent GDM. This study employed an analytical approach with a cross-sectional design. The population consisted of pregnant women visiting the obstetrics and gynecology clinic. This community service activity was conducted at the Obstetrics and Gynecology Clinic of Kediri Regency Hospital (RSKK) using lecture-based counseling, interactive discussions, and the distribution of educational leaflets. Evaluation was done by comparing pregnant women's knowledge levels before and after counseling using a pre-test and post-test. Data were analyzed using the Wilcoxon statistical test. Among the 40 respondents who participated in the counseling before the education, it was found that 24 pregnant women (60%) had low knowledge levels, 12 pregnant women (30%) had moderate knowledge, and only 4 (10%) had good knowledge. After the counseling, a significant improvement was observed, with 35 pregnant women (88%) had good knowledge and five pregnant women (12%) had moderate knowledge. The Wilcoxon test results indicated a significant increase in knowledge after the educational intervention. This education program should be continuously implemented with the support of healthcare workers and adequate facilities to raise awareness and prevent the occurrence of GDM in pregnant women.

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INTRODUCTION

Diabetes Mellitus (DM) is a metabolic disorder characterized by hyperglycemia due to the pancreas's inability to secrete insulin, insulin resistance, or both (Nur, U., & Pamungkas, 2023; PERKENI, 2021). According to data from the Indonesian Ministry of Health (2020), the International Diabetes Federation (IDF) estimated that at least 483 million people aged 20-79 worldwide suffer from diabetes, accounting for a prevalence rate of 9.3% of the total population in that age group. Indonesia ranks 7th among the 10 countries with the most diabetics, with approximately 10.7 million cases (Soelistijo, 2021). The World Health Organization (WHO) predicts that the number of type 2 DM patients in Indonesia will increase from 8.4 million in 2000 to approximately 21.3 million by 2030. IDF projections also show that between 2019 and 2030, the number of DM patients will rise from 10.7 million to 13.7 million (Soelistijo, 2021).

Gestational Diabetes Mellitus (GDM) is a condition of glucose intolerance that first occurs or is detected during pregnancy and usually returns to normal after childbirth (PERKENI, 2021b). GDM is a form of glucose intolerance that develops during pregnancy (Pheiffer, C., Dias, S., & Adam, 2023). This condition is typically detected around the 24th week of pregnancy (Rahayu, 2019). Over the past 20 years, the prevalence of GDM has continued to increase. Globally, 16.2% (21.3 million) of live births are associated with hyperglycemia during pregnancy, with 86.4% caused by GDM, 6.2% by pre-existing type 1 or type 2 diabetes, and 7.4% by newly diagnosed type 1 or type 2 diabetes during pregnancy. If glucose is not adequately managed, GDM can increase perinatal complications and metabolic diseases in both mother and child (Adli, 2021; Pheiffer, C., Dias, S., & Adam, 2023).

In 2015, the American Diabetes Association (ADA) stated that 7% of pregnancies are affected by gestational diabetes each year. The prevalence of gestational diabetes in pregnant women with a family history of diabetes mellitus is 5.1% (Rahayu, A., 2019). The International Diabetes Federation (IDF) reported in 2017 that GDM affects approximately 14% of pregnancies worldwide, accounting for about 18 million births annually (Maharani et al., 2022; Plows JF, Stanley JL, Baker PN, Reynolds CM, 2028).

DM in East Java reached 842,004 cases 2023 (Dinas Kesehatan Jawa Timur., 2023). Disease trend data from the Semen Health Center show that diabetes mellitus ranks fourth among the top 10 highest-trending diseases. In 2019, there was an increase of 495 cases, a decrease of 241 cases in 2020, and another increase of 677 cases in 2021, with patient characteristics including gender, age, and (Jayanti & Fitriyani, 2022; Mintarsih, 2019).
Labor complications and the risk of metabolic diseases can have long-term impacts on both mother and child if glucose management is not appropriately handled (Pheiffer, C., Dias, S., & Adam, 2023; Smith, 2017) . GDM can increase the risk of pregnancy and childbirth complications, affecting both the mother and baby. GDM-related health problems can persist into the future, making prevention and treatment crucial (PERKENI, 2021a; Wicklow, B., & Retnakaran, 2023).

Mothers with GDM, as well as their babies, are at high risk both during pregnancy and after childbirth. Mothers may experience excessive weight gain, eclampsia, preeclampsia, cesarean delivery, cardiovascular complications, and even death during childbirth. After delivery, they are also at risk of developing type 2 diabetes or recurrent gestational diabetes in future pregnancies (Phillips, Celeste R., Zwelling, 2001; Rahayu, A., 2019). Risks to the baby include macrosomia (birth weight over 4.5 kg), shoulder dystocia (23.5%), central nervous system disorders (18.4%), congenital heart disease (21.0%), respiratory disorders (7.9%), intestinal atresia (2.6%), bladder and kidney defects (11.8%), anal atresia (2.6%), upper limb deficiency (3.9%), lower limb deficiency (6.6%), and upper spinal abnormalities (Djamaluddin, N., & Mursalin, 2020; Kurniawan, 2017).

Previous community service activities found that nearly half of pregnant women were unaware of gestational diabetes mellitus. Many believed that diabetes only affected the elderly. This lack of knowledge highlights the need for guidance and education on maternal health during pregnancy. The findings emphasize the importance of conducting health education programs to increase awareness of gestational diabetes mellitus during pregnancy.

METHODS

The target community for this community service activity was pregnant women receiving antenatal care at the Obstetrics and Gynecology

Clinic of *Rumah Sakit Kabupaten Kediri (RSKK)*. A total of 40 pregnant women were participated in the program. Most of them were housewives with high school education and in their first pregnancy, indicating limited exposure to structured maternal health education. Their role in the activity was as direct beneficiaries and active participants in the counseling sessions, where they contributed by engaging in discussions, completing pre- and post-test questionnaires, and providing feedback on the materials delivered. This program was facilitated by doctoral students from the Public Health Doctoral Program at Universitas Strada Indonesia. The facilitators had academic backgrounds in health education and maternal-child health promotion. They were responsible for designing the intervention materials, leading the sessions, and conducting the evaluation processes. The RSKK healthcare staff contributed logistical support and helped with participant coordination.

The intervention used a lecture-discussion approach with supporting educational materials and evaluation tools. Educational Instruments: Printed leaflets and counseling booklets on GDM, nutrition, and physical activity. Projector and visual aids used during presentations. Evaluation Instruments: Structured knowledge questionnaires (multiple choice format) developed specifically to assess understanding of GDM, validated internally by academic supervisors. Data was collected using quantitative methods. Descriptive statistics were used to summarize the characteristics of respondents and knowledge levels. The Wilcoxon Signed-Rank Test, a non-parametric statistical test, was applied to compare pre- and post-test scores due to non-normal data distribution. Normality was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. The change in standard deviation and mean scores was interpreted to determine the uniformity and impact of the intervention.

RESULTS

Table 1. Characteristics of Respondents

Criteria	N	Percentage
Respondent's Education		
Elementary School	2	5
Junior High School	5	12
Senior High School	25	63
College	8	20
Respondent's Occupation		
Housewife	31	78
Private Employed	1	2
Civil Servants	8	20
Pregnancy History		
1	24	60
2	13	33
3	2	5
4	1	2
Blood Sugar Score		
Negative	27	67
Positive	13	33
	40	100

Source: *Primary Data*

Based on the Table 1, it can be observed that most respondents had a high school education (63%), while the least had only elementary education (5%). Most respondents were housewives (78%), while the fewest were private employees (2%). Regarding pregnancy history, most respondents were experiencing their first pregnancy (60%), while only 2% were in their fourth pregnancy. Regarding blood sugar examination results, most respondents (67%) had negative results.

Table 2. Distribution of Respondents' Knowledge Before and After Education

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statiscic	df	Sig.	Statiscic	Df	Sig.
Pretest	.236	40	.000	.915	40	.005
Posttest	.396	40	.000	.685	40	.005
a. Lilliefoers Significance Correction						

The table above shows that before the counseling session on nutrition and physical activity to prevent GDM, 60% of respondents had low knowledge, while 30% had moderate knowledge. After the session, knowledge significantly improved, with 88% of respondents having good knowledge and 12% having moderate knowledge.

Table 3. Analysis of Differences in Knowledge Before and After Education

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statiscic	df	Sig.	Statiscic	Df	Sig.
Pretest	.236	40	.000	.915	40	.005
Posttest	.396	40	.000	.685	40	.005
a. Lilliefoers Significance Correction						

Table 4. Wilcoxon Signed Ranks Test

Ranks				
		N	Mean Rank	Sum Of Ranks
Posttest-Pretest	Negative Ranks	1[a]	200	2.00
	Positive Ranks	36[b]	19.47	701.00
	Ties	3[c]		
	Total	40		
a. Posttest < Pretest b. Posttest > Pretest c. Posttest = Prestest				

The above analysis shows that the pre-test's standard deviation (SD) was 1.305, indicating a considerable variation around the mean of 5.80. That means most pre-test scores were within 1.305 points above or below the mean. The post-test SD was 1.181, indicating that post-test scores were more concentrated around the mean of 9.13 compared to the pre-test. Although the mean post-test score was higher, the variation among scores was slightly lower than in the pre-test. It suggested that participants' scores were more consistent after the intervention and centered around a higher mean. The reduction in SD from the pre-test to the post-test indicates that the intervention successfully improved participants' understanding, reducing variations in results. It also confirms that counseling effectively enhanced pregnant women's knowledge about nutrition and physical activity in preventing GDM.

DISCUSSION

Respondent Characteristics

This study's analysis of respondent characteristics shows that most pregnant women had a high school education (63%), while only a small portion had an elementary school education (5%). The educational level is crucial in understanding health information, including preventing and managing gestational diabetes mellitus (GDM). According to a study by (Alharthi, A. S., Althobaiti, K. A., & Alswat, 2018; Kwan, D. P., & Susanto, 2022), pregnant women with higher education levels tend to have better access to health information and a more remarkable ability to understand the

importance of a healthy diet and physical activity in preventing GDM.

Regarding employment, most respondents were housewives (78%), while a minor proportion worked in the private sector (2%). This finding aligns with research by Wicklow, B. & Retnakaran (2023), which states that housewives tend to adopt more varied dietary habits but may also face a higher risk of a sedentary lifestyle if they lack sufficient information on the importance of physical activity during pregnancy.

The majority of respondents in this study were experiencing their first pregnancy (60%). A first pregnancy is often associated with higher levels of anxiety and lack of knowledge regarding pregnancy health, including the risks of GDM. According to (American Diabetes Association (ADA), 2021; Mamonto, F. A., Bunsal, C. M., & Rimporok, 2021), first-time pregnant women require more guidance and education on preventing pregnancy complications, including GDM, as they have no prior experience in managing their health during pregnancy.

Blood glucose examination showed that most respondents (67%) had negative results, while 33% were diagnosed with GDM. This proportion is consistent with reports from the International Diabetes Federation, (International Diabetes Federation (IDF), 2021) which states that GDM prevalence worldwide ranges between 10–20% but may be higher in populations with specific risk factors such as obesity, family history of diabetes, and an unbalanced diet. Early detection of GDM is crucial because pregnant women with this condition are at higher risk of complications such as fetal macrosomia, preeclampsia, and the potential development of type 2 diabetes postpartum (Harreiter et al., 2014; Pramita et al., 2021).

These findings emphasize the importance of broader educational interventions, particularly for pregnant women with lower educational levels and first-time pregnancies. Additionally, regular blood sugar monitoring and increased awareness of a healthy lifestyle during pregnancy can help reduce GDM incidence and improve maternal and infant health in the long term.

Distribution of Respondents' Knowledge Before and After Education

The evaluation results from the education program indicate a significant increase in pregnant women's understanding of nutrition and physical activity as a preventive measure for GDM. Before counseling, 60% of pregnant women had low knowledge levels, and only 10% had good knowledge. However, after the education session, a significant improvement was observed, with 88% of pregnant women having good knowledge and none categorized as having low knowledge.

This improvement aligns with various studies showing that health education interventions play a critical role in increasing pregnant women's awareness of GDM risks and prevention strategies. According to (Di et al., 2023; Wicklow, B., & Retnakaran, 2023), education on a healthy diet and physical activity can effectively reduce the risk of GDM and improve glycemic control in pregnant women. Structured education also helps pregnant women understand the importance of monitoring blood glucose levels and adopting a healthy lifestyle to prevent pregnancy complications.

Another study by (Fradianto et al., 2023; Ingstrup et al., 2019) found that education-based interventions can enhance pregnant women's awareness of the importance of a balanced diet and physical activity in managing blood glucose levels. Health education delivered through lectures, discussions, and leaflet distribution proved more effective than one-way counseling, as it allows pregnant women to interact and clarify misunderstandings.

Additionally, the success of the education program in this study may be attributed to the applied counseling methods, which focused on participant needs. (American Diabetes Association (ADA), 2021; Fantinelli et al., 2019; Igwesi-Chidobe et al., 2022) emphasizes that interactive health education based on real-life experiences is more effective in changing health behaviors compared to passive lecture methods.

With this increased knowledge, pregnant women are expected to adopt healthier eating habits and engage in physical activity to reduce their risk of GDM. The success of this education program also highlights the importance of continuously strengthening maternal health education programs, including the involvement of healthcare professionals, family support, and health policies that promote preventive and promotive interventions in maternal health services.

Analysis of Differences in Respondents' Knowledge Before and After Education

Statistical analysis showed that the pre-test's standard deviation (SD) was 1.305, indicating significant variation in participant scores around the mean of 5.80. This means that pre-test scores were more widely distributed, reflecting differences in participants' knowledge levels before the intervention.

After the education intervention on nutrition and physical activity for preventing GDM, the post-test average increased to 9.13, with an SD of 1.181. This decrease in SD indicates that participants' scores were more concentrated around the mean, meaning that variations among individuals were reduced. It suggested that the intervention effectively improved participants' knowledge more uniformly.

The decrease in SD from the pre-test to the post-test confirms that the counseling provided increased overall knowledge levels and helped equalize understanding among participants. Effective interventions provide explicit, systematic, and easily understandable information, reducing comprehension gaps.

Several previous studies also support these findings. According to research by (Gilbert et al., 2019; Kartika, A., 2021), health education on nutrition and physical activity for pregnant women can enhance their understanding of GDM risks and the importance of prevention through a healthy diet and appropriate physical activity. Similarly, a study (Nugroho, R., 2022) found that counseling-based interventions effectively increased pregnant women's awareness and adherence to healthy lifestyles to prevent GDM.

Thus, this study's findings highlight the importance of education-based interventions in improving pregnant women's knowledge of nutrition and physical activity as preventive measures against GDM. Effective counseling increases the average level of understanding and reduces variations in knowledge among participants, creating more significant knowledge equity.

CONCLUSION

This community service activity aimed to enhance pregnant women's knowledge regarding the prevention and management of gestational diabetes mellitus (GDM) through nutrition and physical activity education. The evaluation results showed a significant increase in participants' understanding after the counseling session. Before the education, most participants had low knowledge levels (60%), but 88% of pregnant women had good knowledge after the intervention.

This education program improved pregnant women's understanding of GDM, particularly regarding a healthy diet and the importance of physical activity. However, challenges remain, such as the lack of specialized healthcare personnel for health education at RSKK and limited educational facilities. Therefore, continuing this program, supported by medical personnel, enhanced educational facilities, and collaboration with relevant stakeholders, is necessary to ensure the optimal implementation of GDM prevention programs.

SUGGESTION

It is recommended that *Rumah Sakit Kabupaten Kediri (RSKK)* continues and expands the implementation of structured education programs on gestational diabetes mellitus (GDM). The hospital should allocate specific resources, including trained educators and tailored materials, to support ongoing counseling for pregnant women. Integrating GDM education into routine antenatal care would ensure sustainability and broader impact.

The Obstetrics and Gynecology Clinic is encouraged to regularly evaluate the effectiveness of its educational interventions through follow-up assessments and to explore incorporating digital platforms (e.g., mobile apps or videos) to reinforce learning. Additionally, improving documentation and feedback mechanisms from participants may help refine future programs.

Pregnant women are encouraged to actively participate in all educational sessions and apply the knowledge gained about healthy eating and physical activity in their daily routines. They are also advised to communicate openly with healthcare providers regarding any concerns or challenges in implementing GDM prevention strategies and to undergo regular glucose monitoring throughout their pregnancy.

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CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this article. All research activities, including study design, data collection, analysis, and interpretation, were conducted independently without any influence from external parties. Additionally, no financial, personal, or professional relationships exist that could have inappropriately influenced the outcomes of this study

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