

THE RELATIONSHIP BETWEEN FAMILY HISTORY OF DIABETES MELLITUS AND HBA1C CATEGORIES AMONG POSTPARTUM WOMEN ATAU ASSOCIATION BETWEEN FAMILY HISTORY OF DIABETES MELLITUS AND GLYCEMIC STATUS BASED ON HBA1C AMONG POSTPARTUM WOMEN

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ABSTRAK

Diabetes melitus merupakan masalah kesehatan global dengan prevalensi yang terus meningkat. Masa nifas menjadi periode penting untuk mendeteksi gangguan metabolisme glukosa, terutama pada ibu dengan faktor risiko seperti riwayat diabetes melitus dalam keluarga. Penelitian ini bertujuan menganalisis hubungan riwayat diabetes melitus dalam keluarga dengan risiko diabetes melitus pada ibu nifas berdasarkan pemeriksaan HbA1c. Penelitian kuantitatif dengan desain analitik korelasional dan pendekatan cross-sectional dilakukan pada 26 ibu nifas usia 35–42 hari postpartum di wilayah kerja Puskesmas Ngasem Kabupaten Kediri pada Januari–Mei 2026. Sampel dipilih menggunakan purposive sampling. Data riwayat diabetes melitus keluarga diperoleh melalui wawancara terstruktur, sedangkan risiko diabetes melitus dinilai berdasarkan kadar HbA1c. Analisis menggunakan uji Chi-Square dengan tingkat signifikansi $\alpha=0,05$. Sebagian besar responden tidak memiliki riwayat diabetes melitus dalam keluarga (69,2%) dan memiliki kadar HbA1c normal (81,0%). Sebanyak 19,0% mengalami prediabetes dan tidak ditemukan kasus diabetes melitus. Hasil uji Chi-Square menunjukkan $p=0,115$ ($p>0,05$), sehingga tidak terdapat hubungan signifikan antara riwayat diabetes melitus dalam keluarga dengan risiko diabetes melitus pada ibu nifas berdasarkan kadar HbA1c. Tidak adanya hubungan yang signifikan dapat disebabkan oleh jumlah sampel yang terbatas dan adanya faktor lain yang tidak dianalisis dalam penelitian ini.

Kata Kunci : Diabetes Militus, HbA1c, Nifas, Riwayat Keluarga,

ABSTRACT

Diabetes mellitus is a global health problem with a continuously increasing prevalence. The postpartum period is an important time to detect glucose metabolism disorders, particularly among women with risk factors such as a family history of diabetes mellitus. This study aimed to analyze the relationship between family history of diabetes mellitus and diabetes mellitus risk among postpartum women based on HbA1c levels. A quantitative study with a correlational analytic design and cross-sectional approach was conducted among 26 postpartum women at 35–42 days postpartum in the working area of Ngasem Public Health Center, Kediri Regency, from January to May 2026. Participants were selected using purposive sampling. Family history data were collected through structured interviews, while diabetes mellitus risk was assessed based on HbA1c levels. Data were analyzed using the Chi-square test with a significance level of $\alpha=0.05$. Most respondents had no family history of diabetes mellitus (69.2%) and had normal HbA1c levels (81.0%). Prediabetes was identified in 19.0% of respondents, while no respondents were classified as having diabetes mellitus. The Chi-square test showed $p=0.115$ ($p>0.05$), indicating no significant relationship between family history of diabetes mellitus and diabetes mellitus risk among postpartum women based on HbA1c levels. The absence of a significant association may reflect the limited sample size and the influence of other factors that were not assessed in this study.

Keywords : Diabetes mellitus; Family history; HbA1c; Postpartum; Postpartum women

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INTRODUCTION (PENDAHULUAN)

Diabetes mellitus refers to a group of metabolic disorders characterized by elevated blood glucose levels, or hyperglycemia (Klin et al., 2026). It is a group of physiological dysfunctions characterized by hyperglycemia resulting directly from insulin resistance, inadequate insulin secretion or production, or excessive glucagon secretion (Vito, 2023). Diabetes mellitus is a condition characterized by persistently elevated blood glucose levels. It is a metabolic disorder marked by hyperglycemia resulting from impaired insulin secretion, impaired insulin function, or both (Rakhmawati, 2025).

The global prevalence of diabetes mellitus among individuals aged 20–79 years reached 10.5% in 2021 and is projected to increase to 12.2% by 2045 (Pavkov et al., 2024). The number of people living with diabetes mellitus increased from 108 million in 1980 to 422 million in 2014 (Risk & Collaboration, 2008). According to data from the International Diabetes Federation (IDF) in 2021, approximately 537 million adults aged 20–79 years were living with diabetes mellitus (International Diabetes Federation, 2021). This number is projected to increase to 643 million by 2030 and 783 million by 2045 (International Diabetes Federation, 2021). In Indonesia, the 2018 Basic Health Research (RISKESDAS) reported a national diabetes

mellitus prevalence of 8.5%, equivalent to approximately 20.4 million diagnosed cases (RISKESDAS, 2018).

Based on a preliminary study conducted by the Kediri District Health Office, the prevalence of diabetes mellitus in Kediri Regency was 1.7% in 2023 and increased to 1.89% in 2024. The highest prevalence was recorded at Ngasem Public Health Center, Kediri Regency, increasing from 4.36% in 2023 to 4.62% in 2024. In addition, the proportion of postpartum women at Ngasem Public Health Center increased from 4.36% in 2023 to 4.92% in 2024.

Patients with diabetes mellitus, particularly gestational diabetes mellitus, have an increased risk of developing type 2 diabetes mellitus or postpartum glucose intolerance compared with women without diabetes mellitus (Champion et al., 2023). Diabetes mellitus during the postpartum period is particularly associated with persistent insulin resistance and pancreatic β -cell dysfunction following delivery (K. Kim et al., 2026). Limited β -cell compensatory capacity may result in persistent hyperglycemia during the postpartum period. Although insulin resistance decreases after delivery, pre-existing β -cell dysfunction does not completely recover, resulting in continued impairment of glucose metabolism (Lee et al., 2025). At 6–12 weeks postpartum, some

women may develop glucose intolerance due to an imbalance between insulin sensitivity and insulin secretion. Postpartum hormonal changes, including decreases in estrogen and progesterone levels, may also affect glucose metabolism. The interaction of these factors may lead to persistent disruption of glucose homeostasis after delivery (Liu et al., 2023; Skajaa et al., 2020).

Women with early gestational diabetes have a higher risk of developing postpartum diabetes because of more severe metabolic disturbances beginning in early pregnancy. Greater insulin resistance and more severe β -cell dysfunction may prevent the body from returning to a normoglycemic state after delivery. In addition, the prevalence of postpartum impaired glucose tolerance may increase, representing a transitional stage toward type 2 diabetes mellitus (Mittal et al., 2025).

Diabetes mellitus (DM) is a serious chronic endocrine disorder characterized by hyperglycemia and may lead to various complications, including diabetic foot, diabetic nephropathy, diabetic retinopathy, and cardiovascular disease (Niu et al., 2024). If not adequately controlled, diabetes mellitus can cause serious health consequences. The disease may damage both small and large blood vessels, thereby increasing the risk of heart disease, stroke, nerve damage (neuropathy), visual

impairment (retinopathy), and kidney failure (nephropathy). In addition, individuals with diabetes are susceptible to poorly healing wounds, particularly on the feet, which may ultimately increase the risk of amputation (Fauziyyah & Utama, 2024).

In general, diabetes mellitus may lead to complications if not properly managed. Therefore, appropriate treatment is necessary to control blood glucose levels and prevent further health problems. Pharmacological treatment may involve medications such as sulfonylureas, glinides, biguanides, thiazolidinediones (TZDs), α -glucosidase inhibitors, dipeptidyl peptidase-4 inhibitors, sodium-glucose cotransporter-2 inhibitors, and insulin (Soebagijo et al., 2021).

In addition to pharmacological treatment, non-pharmacological therapy is also important in the management of diabetes mellitus among postpartum women with obesity. Such interventions include adopting a balanced diet, reducing carbohydrate intake, increasing protein consumption, and engaging in regular physical activity to promote weight loss and improve insulin responsiveness. Regular HbA1c testing is recommended because it reflects average blood glucose levels over the previous three months. Regular monitoring may contribute to better glycemic control and minimize the risk of complications (Rahman, Sylvia Meristika,

et al., 2020). Regardless of the therapy provided, individuals with diabetes mellitus should maintain controlled blood glucose levels to prevent potential complications. Therefore, HbA1c measurement is an important clinical indicator. HbA1c is a form of glycated hemoglobin and a subfraction produced through the attachment of glucose molecules to hemoglobin A (HbA), the predominant adult hemoglobin, and its level increases with average blood glucose concentration. HbA1c reflects average blood glucose levels over the previous two to three months because it remains stable throughout the lifespan of erythrocytes, approximately 100–120 days. HbA1c measurement is considered an important method for assessing the risk of tissue damage resulting from hyperglycemia. Although glycemic control is essential for preventing diabetes-related complications, this target has not yet been adequately achieved in Indonesia, as indicated by a reported average HbA1c level of 87%. According to the National Glycohemoglobin Standardization Program (NGSP), a normal HbA1c value is $\leq 7\%$ (Hadiono, Jennifer Irene Amorita, 2023).

Type 2 diabetes mellitus develops through the interaction of multiple risk factors related to lifestyle, medical conditions, heredity, psychosocial factors, and demographic characteristics, including elevated serum uric acid levels, sleep

quality and duration, smoking, depression, cardiovascular disease, dyslipidemia, hypertension, aging, ethnicity, family history of diabetes, physical inactivity, and obesity (Ismail et al., 2021). A family history of diabetes mellitus is an important genetic factor that may increase the susceptibility of postpartum women to developing type 2 diabetes mellitus through a genetic predisposition to impaired glucose metabolism (M. J. Choi et al., 2022).

Women with a family history of diabetes have a higher risk of developing gestational diabetes mellitus (GDM), which is a major predictor of diabetes mellitus during the postpartum period, suggesting a continuum of risk from pregnancy to postpartum (Lewandowska, 2021). A study by Monod et al. (2023) demonstrated that the risk of diabetes increases with the degree of familial relatedness, with women who have a first-degree relative with diabetes having a higher risk than those with an affected second-degree relative. The risk may increase to an odds ratio (OR) of 4.69 when both parents have diabetes. A systematic study also showed that family history is an important factor in the progression from gestational diabetes mellitus to type 2 diabetes mellitus, which may occur during the postpartum period as a result of impaired pancreatic β -cell function (You et al., 2021).

However, several studies have shown

that a family history of diabetes mellitus is not always the dominant factor associated with diabetes mellitus among postpartum women. The risk of postpartum diabetes may be more strongly influenced by metabolic and lifestyle factors, including obesity, a history of gestational diabetes, insulin resistance, dietary patterns, and physical activity, than by genetic factors alone (Elomrani et al., 2025). Modifiable factors, including body mass index, dietary patterns, physical activity, and weight control, may contribute to the development of diabetes and postpartum glucose intolerance, particularly among women with a history of gestational diabetes mellitus (Liu et al., 2023). Similarly, other studies have found that the primary factors associated with postpartum diabetes include a history of gestational diabetes, glucose levels during pregnancy, and maternal obesity, whereas family history does not always demonstrate an independent significant association (Kapoor et al., 2024).

Other studies have also demonstrated that genetic predisposition does not directly cause diabetes in the absence of other metabolic risk factors. Lee et al. (2023) reported that a family history of diabetes is more strongly associated with certain clinical characteristics but cannot be used as the sole predictor of diabetes among adults. Wang et al. (2022) also reported that

individuals without a family history of diabetes may still develop the disease because of strong environmental influences and metabolic changes. In an Indonesian population study, the management of clinical factors such as blood glucose levels, healthy lifestyle behaviors, and weight control was found to have a greater influence on diabetes outcomes than family history alone (Soeatmadji et al., 2022). Therefore, a family history of diabetes mellitus may not directly influence the risk of diabetes mellitus among postpartum women when metabolic and lifestyle factors are adequately controlled (Yunir et al., 2023).

Diabetes mellitus (DM) is a chronic metabolic disease with a continuously increasing global prevalence and remains a major public health challenge because of its contribution to long-term morbidity and mortality (Banday et al., 2020). The risk factors for diabetes mellitus are multifactorial and include genetic, lifestyle, environmental, and familial factors (Saeedi et al., 2019). A family history of diabetes mellitus is known to increase an individual's susceptibility to impaired glucose metabolism through interactions between genetic factors and inherited biological predispositions (Peng et al., 2025).

The postpartum period is a transitional phase following childbirth characterized by complex physiological and metabolic

changes in the maternal body (Mora-Ortiz & Rivas-García, 2024). During the postpartum period, changes in insulin sensitivity and glucose metabolic adaptation may affect maternal health, particularly among women with specific risk factors (Bengtson et al., 2022). These conditions make the postpartum period an important phase for detecting potential disturbances in glucose metabolism and the future risk of developing diabetes mellitus (Quansah et al., 2021).

Family history of diabetes is frequently investigated as a risk factor for diabetes mellitus; however, previous studies have primarily focused on patients with diabetes, women of reproductive age, or pregnant women rather than postpartum women (Aab & Ti, 2019). Most of these studies have used random blood glucose, fasting blood glucose, or other clinical risk factors as assessment parameters (Rahmawati et al., 2023). These approaches may not fully reflect long-term glycemic status and therefore may provide a less comprehensive assessment of diabetes risk.

Glycated hemoglobin, or HbA1c, is an indicator that reflects average blood glucose levels over the previous two to three months and can therefore be used as a screening tool for diabetes mellitus risk (American Diabetes Association, 2024). A study by Coetzee et al. (2023) demonstrated that postpartum HbA1c testing has the potential

to facilitate the early detection of glucose metabolism disorders among women after pregnancy. HbA1c testing also has the advantage of not requiring fasting and can provide an overview of long-term glycemic control compared with a single blood glucose measurement (Quansah et al., 2021).

Several studies have examined risk factors for postpartum glucose disturbances, particularly among women with a history of gestational diabetes mellitus. Choi et al. (2022) investigated risk factors for postpartum type 2 diabetes mellitus among women with gestational diabetes, while Liu et al. (2023) identified several factors associated with early postpartum glucose intolerance. However, evidence specifically examining the relationship between family history of diabetes mellitus and HbA1c levels among postpartum women remains limited. Therefore, further research is needed to assess whether family history of diabetes mellitus is associated with diabetes risk among postpartum women based on HbA1c levels.

Based on the aforementioned evidence, a research gap exists because previous studies have generally examined family history, HbA1c, and postpartum populations separately (Coetzee et al., 2023). To date, no study has specifically examined the relationship between a family

history of diabetes mellitus and the risk of diabetes mellitus among postpartum women based on HbA1c measurement. Therefore, this study aimed to analyze the relationship between a family history of diabetes mellitus and the risk of diabetes mellitus among postpartum women based on HbA1c measurement, with the aim of contributing to the early detection of diabetes during the postpartum period.

METHODS (METODE)

This study employed a quantitative research design with a correlational analytic approach using a cross-sectional design. The study population comprised all postpartum women at 35–42 days postpartum residing in the working area of Ngasem Public Health Center, Kediri Regency. A total of 26 respondents were included in the study. The participants were selected using purposive sampling. The study was conducted from January to May 2026.

The independent variable was a family history of diabetes mellitus among first-degree relatives, determined based on the participant's self-reported information. Participants were asked whether their parents or siblings had a history of diabetes mellitus diagnosed by a healthcare professional. This information was not verified through medical records. The dependent variable was the risk of diabetes

mellitus among postpartum women, assessed based on HbA1c levels.

The inclusion criteria were postpartum women at 35–42 days postpartum who were willing to participate by signing informed consent, were able to communicate effectively, had or were able to provide information regarding diabetes mellitus in their first-degree relatives, were willing to undergo HbA1c testing, and were in a stable general condition. The exclusion criteria included postpartum women with a history of diabetes mellitus before or during pregnancy, those currently taking medications that significantly affect blood glucose levels, those with chronic diseases that could affect HbA1c results, those experiencing severe postpartum complications, those who did not complete the HbA1c examination or had incomplete data, and those who refused or withdrew from the study during the research process. Data regarding family history of diabetes mellitus were collected using an observation sheet through structured interviews. HbA1c levels were measured by laboratory personnel from Kediri Regency in accordance with standard procedures. Data were analyzed using the Chi-square test with a 95% confidence level and a significance level of $\alpha = 0.05$.

This study received ethical approval from the Ethics Committee of STIKES Baptis Kediri on June 2, 2026, under ethical

clearance number 012/2/III/KEPK-3/STIKES RSBK/2026.

RESULTS (HASIL)

Tabel 1 Karakteristik Responden

Karakteristik	f	%
Age		
20-30 years	13	50
31-40 years	12	46
>40 years	1	4
Education		
Elementary school	1	4
Junior High School	1	4
Senior High School	13	50
Beachelor's Dengree	11	42
Profession		
Housewife	15	58
Emplove	4	15
Other	7	27
Family History of Diabetes Militus		
Present	8	30
Absent	18	69
Value		
Normal	21	81
Prediabetic	5	19
Diabetic	0	0
Total	26	100

Table 1 shows that most postpartum women were aged 20–30 years, accounting for 13 respondents (50.0%), followed by those aged 31–40 years with 12 respondents (46.0%), while only 1 respondent (4.0%) was aged >40 years. Regarding education, half of the respondents had completed senior high school (13; 50.0%), followed by a bachelor's degree (11; 42.0%), while only 1 respondent (4.0%) each had completed elementary and junior high school. Most respondents were housewives (15; 58.0%), followed by other occupations (7; 27.0%) and employees (4; 15.0%). Most respondents had no family history of

diabetes mellitus (18; 69.2%), while 8 (30.8%) reported a family history. Based on HbA1c examination, most respondents had normal HbA1c levels (21; 81.0%), while 5 (19.0%) were classified as having prediabetes. No respondents were classified as having diabetes mellitus.

Tabel 2 Relationship Between Family History of Diabetes Mellitus and HbA1c Categories Among Postpartum Women

Family History of Diabetes Militus	Nor mal (<5, 7%)	Prediab etic (>5,7- 6,4%)	Diabe tic (>6,5 %)	Total	P- Value
Present	5	3	0	8	0.115
Absent	16	2	0	18	
Total	21	5	0	26	

Based on the HbA1c examination, among the 8 postpartum women with a family history of diabetes mellitus, 5 respondents (62.5%) had normal HbA1c levels, while 3 respondents (37.5%) were classified as having prediabetes. In comparison, among the 18 respondents without a family history of diabetes mellitus, 16 respondents (88.9%) had normal HbA1c levels and 2 respondents (11.1%) had prediabetes. Although the proportion of prediabetes was higher among respondents with a family history of diabetes mellitus (37.5%) than among those without a family history (11.1%), the Chi-square test showed a p-value of 0.115 ($p > 0.05$). This finding indicates that there was no statistically significant association between family history of diabetes mellitus and the risk of diabetes mellitus among

postpartum women based on HbA1c levels. Furthermore, the Chi-square test was interpreted only after confirming that the expected frequency requirements for a 2×2 contingency table were satisfied, namely that no expected cell frequency was less than 5. Therefore, the observed difference in the proportion of prediabetes between the two groups was not statistically sufficient to establish an association between family history of diabetes mellitus and HbA1c based diabetes mellitus risk in this study.

DISCUSSION (PEMBAHASAN)

Distribution of Family History of Diabetes Mellitus

Based on the study findings, most postpartum women had no family history of diabetes mellitus (69.2%), while 30.8% had a family history of diabetes mellitus. This finding indicates that the majority of respondents had no known genetic risk factor associated with impaired glucose metabolism. A family history of diabetes mellitus is an important risk factor associated with increased susceptibility to insulin resistance and impaired glucose tolerance through a combination of genetic and environmental factors (Hasanah et al., 2025).

The proportion of respondents with a family history of diabetes mellitus in this study was relatively lower than that reported by Monod et al. (2023), who found

that approximately one-quarter to one-third of pregnant women with a family history of type 2 diabetes had a higher metabolic risk than those without a family history. The study indicated that having a first-degree relative with diabetes was associated with an increased risk of impaired glucose metabolism from early pregnancy (Monod et al., 2023).

Although most respondents had no family history of diabetes, this condition does not completely eliminate the possibility of glycemic disturbances during the postpartum period. A recent meta-analysis showed that other factors, including obesity, excessive gestational weight gain, a history of gestational diabetes, and sedentary lifestyle, may contribute to postpartum glucose intolerance, even among women without a family history of diabetes (Holela et al., 2025).

These findings further support the concept that diabetes mellitus is a multifactorial disease. A postpartum glucose intolerance prediction model demonstrated that family history is only one component of risk, while other clinical factors, such as glucose levels during pregnancy, body mass index, and metabolic characteristics, also contribute substantially to the risk of glucose disturbances after childbirth (Belsti et al., 2023).

In addition to genetic factors, a recent cohort study indicated that the interaction between familial predisposition and health behaviors plays an important role in determining future diabetes risk. Individuals with a family history of diabetes who maintained a healthy lifestyle had a lower risk than those with a similar genetic predisposition but unhealthy lifestyle behaviors (Tsenkova et al., 2017). Thus, family history should not be considered the sole determinant of diabetes mellitus risk. In this study, the predominance of respondents without a family history of diabetes may partly explain the low proportion of metabolic disturbances identified by HbA1c examination. Nevertheless, postpartum women with a family history of diabetes still require closer monitoring, as genetic predisposition may increase the risk of developing type 2 diabetes during the postpartum period and in subsequent years.

Distribution of Diabetes Mellitus Categories Among Postpartum Women Based on HbA1c Examination

The study findings showed that most postpartum women had normal HbA1c levels (81.0%), while 19.0% were classified as having prediabetes, and none were classified as having diabetes mellitus. This finding indicates that the overall glycemic status of the respondents remained within the normal range during the postpartum

period. HbA1c examination is widely used to assess glycemic control and identify the risk of diabetes during the postpartum period (Stefanus et al., 2022).

The proportion of prediabetes in this study (19.0%) was lower than that reported in several studies, which found that the prevalence of postpartum glucose intolerance ranged from 20–30% among women with certain risk factors (Idris et al., 2025). This difference may be influenced by respondent characteristics, nutritional status, a history of gestational diabetes, and differences in the timing of postpartum examinations.

The absence of respondents in the diabetes mellitus category indicates that most postpartum women in this study maintained relatively good metabolic adaptation after childbirth. Following placental delivery, levels of pregnancy-related diabetogenic hormones decrease significantly, resulting in improved insulin sensitivity and a tendency for blood glucose levels to return toward normal. This physiological mechanism may explain the improvement in glucose metabolism observed in most women after childbirth (C. Kim, 2024).

Nevertheless, the presence of prediabetes in 19.0% of respondents requires particular attention. Recent research indicates that women with postpartum glycemic results in the

prediabetes range have a higher risk of developing type 2 diabetes in subsequent years if lifestyle interventions and regular monitoring are not implemented (Ballena-Caicedo et al., 2026).

These findings are consistent with previous research indicating that HbA1c examination can be used as an initial screening tool to identify women at risk of impaired glucose metabolism after childbirth. Although HbA1c does not completely replace the oral glucose tolerance test, it provides important information regarding medium-term glycemic status and the potential risk of developing diabetes in the future (American Diabetes Association, 2026).

Overall, the predominance of normal HbA1c levels indicates relatively good metabolic status among most postpartum women in this study. However, the presence of prediabetes highlights the need for health education regarding a balanced diet, regular physical activity, weight management, and periodic glucose screening to reduce the risk of progression to type 2 diabetes mellitus in the future.

Relationship Between Family History of Diabetes Mellitus and Diabetes Mellitus Risk Among Postpartum Women Based on HbA1c Examination

The Pearson Chi-square test showed a p-value of 0.115 ($p > 0.05$), indicating no significant relationship between family

history of diabetes mellitus and diabetes mellitus risk among postpartum women based on HbA1c levels. This finding suggests that family history was not a dominant factor influencing the glycemic status of postpartum women in this study. Although genetic factors are known to contribute to the development of diabetes mellitus, their effects may not be directly evident during the postpartum period because HbA1c levels are also influenced by other factors, including metabolic status during pregnancy, dietary patterns, physical activity, and hormonal changes after childbirth (Takase et al., 2023).

The absence of a significant association may be attributed to the presence of other risk factors that have a stronger influence on HbA1c levels than family history. This is consistent with previous research showing that body mass index, fasting glucose levels, age, hypertension, and insulin use during pregnancy may contribute more substantially to the development of diabetes after childbirth than hereditary factors alone (M. J. Choi et al., 2022). These findings indicate that metabolic factors during pregnancy and the postpartum period play an important role in determining diabetes risk among postpartum women.

The findings also support the concept that HbA1c reflects glycemic control over approximately the previous two to three

months and therefore more closely represents current metabolic status than genetic predisposition (H. Kim et al., 2022). A lipidomic study among women with previous gestational diabetes demonstrated that changes in metabolic profiles and biological biomarkers after childbirth were closely associated with the subsequent risk of type 2 diabetes. Therefore, HbA1c levels measured during the postpartum period may be more strongly influenced by current metabolic conditions than by family history of diabetes (G. Wang et al., 2023).

Although the statistical association was not significant, family history of diabetes remains an important long-term risk factor. A recent meta-analysis reported that a family history of diabetes is one factor that may increase the risk of postpartum glucose intolerance, particularly when accompanied by other factors such as obesity, insulin use during pregnancy, elevated HbA1c during pregnancy, and a previous history of gestational diabetes (Fatrianti & Sulastri, 2025). Therefore, the absence of a significant association in this study does not mean that hereditary factors have no influence, but rather that their effect may not have been sufficiently strong to be detected in the study population and sample size (J. Choi et al., 2019).

The absence of a significant relationship between family history of diabetes mellitus and diabetes mellitus risk

among postpartum women indicates that other factors may play a more dominant role in influencing glycemic status. One factor frequently associated with an increased risk of diabetes is dietary pattern, particularly the consumption of foods and beverages high in sugar. A recent systematic review showed that regular consumption of sugar-sweetened beverages is associated with an increased risk of type 2 diabetes through increased blood glucose levels, insulin resistance, and long-term metabolic disturbances (Giovannucci et al., 2025).

In addition, dietary quality before and during pregnancy has been shown to influence glucose regulation in women. Lindsay et al. (2022) reported that poor dietary quality, generally characterized by high consumption of simple sugars and refined carbohydrates, was associated with increased blood glucose levels and a higher risk of impaired glucose metabolism (Lindsay et al., 2022). These effects may persist into the postpartum period and influence HbA1c results among postpartum women, regardless of the presence or absence of a family history of diabetes.

During the postpartum period, an unhealthy diet may further exacerbate metabolic conditions that were already influenced by risk factors during pregnancy. A study of postpartum metabolic health found that better dietary quality was associated with a healthier

metabolic profile, whereas diets high in sugar and poor in nutritional quality were associated with an increased risk of impaired glucose tolerance after childbirth (Quansah et al., 2022). Therefore, diabetes prevention among postpartum women should not focus solely on genetic factors or family history but should also emphasize dietary modification, particularly limiting the consumption of foods and beverages high in sugar that may affect glycemic control and HbA1c levels.

Postpartum diabetes risk is influenced not only by genetic factors but also by interacting obstetric and health-related behavioral factors. One factor receiving increasing attention is a history of preeclampsia. Recent research has shown that women with a history of preeclampsia have a higher risk of impaired glucose metabolism and type 2 diabetes after pregnancy, potentially due to endothelial dysfunction, insulin resistance, and systemic inflammation that may persist after childbirth (Do et al., 2023). These conditions make preeclampsia an early marker of long-term metabolic disturbances that may increase diabetes risk during the postpartum period and thereafter.

The association between preeclampsia and postpartum diabetes has also been supported by studies showing that women with a history of preeclampsia have a higher incidence of diabetes than women

without hypertensive pregnancy complications. The underlying mechanism is thought to be related to impaired insulin sensitivity that develops during pregnancy and persists after childbirth (Feig et al., 2013). Therefore, postpartum women with a history of preeclampsia require closer metabolic monitoring as part of efforts to prevent diabetes mellitus in the future (Barrell & Sferruzzi-Perri, 2025).

Another factor associated with diabetes mellitus risk among postpartum women is insufficient physical activity. Physical activity plays an important role in improving insulin sensitivity, controlling body weight, and maintaining glucose metabolism. Conversely, sedentary behavior and low levels of physical activity may accelerate insulin resistance, which is a major mechanism underlying the pathogenesis of type 2 diabetes (Ringvoll et al., 2023). Research has also shown that women with a history of gestational diabetes who have low levels of physical activity during the postpartum period tend to have a higher risk of glucose intolerance and diabetes development than those who are physically active (Bracco et al., 2025).

The finding of no significant relationship between family history of diabetes mellitus and diabetes mellitus risk among postpartum women indicates that hereditary factors may not be the most dominant determinants of postpartum

glycemic status. This finding supports the view that diabetes mellitus among postpartum women is a multifactorial condition influenced by interactions among various factors. Although genetic predisposition contributes to the development of diabetes mellitus, its influence may be overshadowed by other factors that have a more direct effect on the mother's metabolic condition during the postpartum period. Therefore, diabetes risk assessment among postpartum women should not rely solely on family history but should also consider clinical and health-related behavioral factors during pregnancy and after childbirth.

The researchers suggest that metabolic factors and pregnancy-related complications may have a greater influence on diabetes mellitus risk among postpartum women than hereditary factors. One factor that requires attention is a history of preeclampsia, which is associated with endothelial dysfunction, insulin resistance, and inflammatory processes that may persist after childbirth. These conditions may increase the risk of impaired glucose metabolism during the postpartum period. In addition, an unhealthy dietary pattern, particularly high consumption of foods and beverages containing simple sugars, may contribute to increased blood glucose and HbA1c levels. Thus, factors related to the mother's current metabolic condition appear

to play a more substantial role in determining postpartum diabetes risk than a family history of diabetes.

In addition to metabolic factors and a history of pregnancy complications, physical activity should also receive attention in diabetes prevention among postpartum women. Physical activity contributes to improved insulin sensitivity, maintenance of glucose metabolism, and weight control after childbirth. Conversely, low physical activity or sedentary behavior may worsen insulin resistance and increase the risk of impaired glucose tolerance. Based on the findings of this study, diabetes mellitus risk among postpartum women may be more strongly influenced by a combination of modifiable factors, such as dietary patterns, physical activity, and a history of preeclampsia, than by genetic factors alone. Therefore, diabetes prevention strategies among postpartum women should focus on identifying modifiable risk factors through health education, metabolic monitoring, and sustained lifestyle interventions after childbirth.

The findings of this study showed no significant relationship between family history of diabetes mellitus and diabetes mellitus risk among postpartum women based on HbA1c levels. This finding differs from several previous studies reporting that family history of diabetes is a risk factor

contributing to the increased incidence of type 2 diabetes and postpartum glucose intolerance. The differences may be attributable to variations in respondent characteristics, sample size, methods of diabetes risk assessment, and the timing of postpartum examinations. Furthermore, this study used HbA1c levels as an indicator of current glycemic status during the postpartum period; therefore, the findings may reflect current metabolic conditions more closely than long-term genetic predisposition.

Another possible explanation is the potential dominance of other risk factors that were not the primary focus of previous studies. In this study, diabetes risk among postpartum women may have been more strongly influenced by modifiable factors, including a high-sugar diet, a history of preeclampsia, and low physical activity, than by family history of diabetes mellitus. Meanwhile, some previous studies have identified genetic factors as major predictors without comprehensively considering the influence of metabolic factors and health behaviors after childbirth. Therefore, these findings provide a perspective that diabetes risk among postpartum women is complex and influenced by interactions among multiple factors. Consequently, preventive approaches should address not only

hereditary factors but also the control of modifiable risk factors.

CONCLUSION (*PENUTUP*)

This study showed that a family history of diabetes mellitus was not significantly associated with the risk of diabetes mellitus among postpartum women based on HbA1c examination. Most postpartum women had glycemic status within the normal range, although some respondents were classified as having prediabetes. These findings indicate that the risk of diabetes mellitus during the postpartum period is influenced not only by hereditary factors but also by other factors related to metabolic conditions and lifestyle after childbirth.

It is recommended to strengthen early detection and monitoring of glycemic status among postpartum women through HbA1c examination, accompanied by education on healthy dietary patterns, regular physical activity, and control of other metabolic risk factors. Postpartum women should be encouraged to adopt a healthy lifestyle after childbirth to prevent future glucose metabolism disorders. Future studies should involve a larger sample size and investigate other factors that may influence the risk of diabetes mellitus among postpartum women, such as a history of preeclampsia, obesity, dietary patterns, and physical activity.

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