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DESCRIPTION OF BLOOD GLUCOSE LEVELS IN MENOPOUS WOMEN WITH HISTORY OF DIABETES MELLITUS IN THE REGION KABILA HEALTH CENTER

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ABSTRACT
Menopause is a physiological condition characterized by the cessation of ovarian function and a decline in estrogen production, which may affect glucose metabolism and increase the risk of impaired glycemic control. Women with a history of diabetes mellitus are particularly vulnerable to blood glucose abnormalities during the menopausal period. This study aimed to describe blood glucose levels among menopausal women with a history of diabetes mellitus in the working area of Kabila Health Center. This research employed a descriptive quantitative design. The study was conducted from August to September 2021 involving menopausal women with a history of diabetes mellitus registered at Kabila Health Center. Respondents were selected using accidental sampling. Blood glucose levels were measured using a glucometer and classified into normal and abnormal categories based on applicable clinical standards. Data were analyzed using univariate descriptive statistics and presented as frequencies and percentages. The findings showed that more than half of the respondents had blood glucose levels within the normal range, while a considerable proportion still experienced abnormal blood glucose levels. These findings indicate that although glycemic control had been achieved in some respondents, blood glucose abnormalities remained common among menopausal women with a history of diabetes mellitus. Hormonal changes associated with menopause, aging, and previous diabetes mellitus may contribute to impaired glucose regulation. In conclusion, blood glucose abnormalities remain prevalent among menopausal women with a history of diabetes mellitus, highlighting the importance of regular monitoring and comprehensive diabetes management to prevent complications and improve health outcomes.

INTRODUCTION

Menopause is a natural biological process characterized by the permanent cessation of menstruation resulting from the decline of ovarian follicular activity. This transition is accompanied by a substantial reduction in estrogen and progesterone production, leading to various physiological and metabolic changes that affect women's health. Among these changes, disturbances in glucose metabolism have received considerable attention because they contribute to the development and progression of metabolic disorders, including diabetes mellitus [1][2].

Glucose is the primary source of energy for body cells and plays an essential role in maintaining normal physiological functions. Under normal conditions, blood glucose levels are regulated by insulin, a hormone produced by the pancreas that facilitates glucose uptake into body tissues. Impairment in insulin secretion or insulin action results in elevated blood glucose levels, a

condition known as hyperglycemia, which is the hallmark of diabetes mellitus. Persistent hyperglycemia may lead to various complications affecting the cardiovascular system, kidneys, eyes, and nervous system [2].

The menopausal transition is associated with hormonal alterations that significantly influence glucose homeostasis. The decline in estrogen levels contributes to increased visceral fat accumulation, reduced insulin sensitivity, and alterations in energy metabolism. Estrogen deficiency also promotes central obesity and metabolic syndrome, conditions that increase the risk of insulin resistance and impaired glucose tolerance among postmenopausal women [1][2]. Furthermore, studies have shown that hormonal changes occurring during menopause are associated with higher fasting glucose levels and an increased risk of developing type 2 diabetes mellitus [3][4].

Diabetes mellitus remains one of the most prevalent chronic diseases worldwide and constitutes a major public health challenge. Women entering menopause represent a particularly vulnerable group because aging and hormonal changes occur simultaneously, increasing susceptibility to glucose metabolism disorders. Previous studies have reported that approximately 10–20% of postmenopausal women experience diabetes mellitus, with prevalence increasing with age and the presence of other metabolic risk factors [5]. In addition to increasing morbidity and mortality, diabetes imposes substantial economic and social burdens through long-term treatment costs and diabetes-related complications [6].

Monitoring blood glucose levels is essential for evaluating glycemic control and preventing diabetes complications. Regular assessment of blood glucose provides valuable information regarding the effectiveness of disease management and helps identify individuals at risk of poor metabolic control. For menopausal women with a history of diabetes mellitus, blood glucose monitoring is particularly important because hormonal changes may exacerbate insulin resistance and contribute to unstable glycemic status [7][8].

Several studies have investigated the relationship between menopause and diabetes mellitus; however, most have focused on the risk factors, pathophysiological mechanisms, or management of diabetes in broader populations. Limited information is available regarding the actual distribution or description of blood glucose levels among menopausal women with a history of diabetes mellitus, particularly in primary healthcare settings. Local data describing glycemic status in this population are needed to support early detection and appropriate disease management strategies.

Based on data from the Bone Bolango District Health Office, menopausal women with diabetes mellitus continue to be identified within the community, including those receiving healthcare services in the Kabila Health Center area. However, information regarding their blood glucose status remains limited. Therefore, this study aims to describe blood glucose levels among menopausal women with a history of diabetes mellitus in the Kabila Health Center area. The findings are expected to provide baseline information that can support efforts to improve diabetes monitoring and management among menopausal women.

RESEARCH METHODS

Study Design

This study employed a descriptive quantitative research design to describe blood glucose levels among menopausal women with a history of diabetes mellitus in the working area of Kabila Health Center. A descriptive quantitative design is used to systematically describe characteristics, conditions, or phenomena within a population without examining causal relationships between variables [9].

Study Setting and Period

The study was conducted in the working area of Kabila Health Center, Bone Bolango Regency, Gorontalo Province, Indonesia. Data collection was carried out from August to September 2021.

Population and Sample

The study population consisted of all menopausal women with a history of diabetes mellitus registered at Kabila Health Center, totaling 87 individuals. A sample of 23 respondents was included in the study. Participants were selected using an accidental sampling technique, whereby individuals who met the study criteria and were available during the data collection period were recruited as respondents [9].

Data Sources

Both primary and secondary data were utilized in this study. Primary data were obtained directly from respondents through blood glucose measurements and interviews to collect demographic information. Secondary data were obtained from medical records at Kabila Health Center to confirm the respondents' history of diabetes mellitus.

Data Collection Procedure

After obtaining informed consent, capillary blood samples were collected from respondents and blood glucose levels were measured using a calibrated glucometer according to standard operating procedures. The measurement results were subsequently classified into normal and abnormal categories based on the clinical reference standards applied at the health center.

Research Instrument

The primary instrument used in this study was a glucometer for measuring capillary blood glucose levels. A structured observation form was also used to record respondents' characteristics and examination results.

Data Analysis

Data were analyzed using univariate descriptive statistics. The characteristics of respondents and blood glucose levels were summarized using frequencies and percentages. The findings were presented in tables and described narratively to provide a comprehensive overview of blood glucose levels among menopausal women with a history of diabetes mellitus in the Kabila Health Center area [9].

RESEARCH RESULT

Characteristics of Respondents

Table 1. Characteristics of Menopausal Women with a History of Diabetes Mellitus in the Kabila Health Center Area (n = 23)

Characteristic	Frequency (n)	Percentage (%)
Age >50 years	23	100.0
Total	23	100.0

Source: Primary Data, 2021.

Table 1 shows that all respondents included in this study were menopausal women aged over 50 years with a history of diabetes mellitus. A total of 23 respondents met the inclusion criteria and participated in the study.

Distribution of Blood Glucose Levels

Table 2. Distribution of Blood Glucose Levels among Menopausal Women

with a History of Diabetes Mellitus in the Kabila Health Center Area (n = 23)

Blood Glucose Level	Frequency (n)	Percentage (%)
Normal	12	52.2
Abnormal	11	47.8
Total	23	100.0

Source: Primary Data, 2021.

Table 2 presents the distribution of blood glucose levels among menopausal women with a history of diabetes mellitus in the Kabila Health Center area. Of the 23 respondents, 12 women (52.2%) had normal blood glucose levels, while 11 women (47.8%) exhibited abnormal blood glucose levels.

The findings indicate that slightly more than half of the respondents maintained blood glucose levels within the normal range. Nevertheless, a considerable proportion of respondents still experienced abnormal blood glucose levels, accounting for nearly half of the study population. This result suggests that glycemic control among menopausal women with a history of diabetes mellitus remains an important health concern.

The relatively high proportion of abnormal blood glucose levels may be associated with physiological changes occurring during menopause, particularly the decline in estrogen production, which can contribute to insulin resistance and impaired glucose metabolism. These hormonal changes, combined with aging and a previous history of diabetes mellitus, may increase the likelihood of elevated blood glucose levels among menopausal women.

Overall, the study demonstrates that although most respondents had normal blood glucose levels, a substantial proportion continued to experience abnormal glycemic conditions, highlighting the importance of regular blood glucose monitoring and appropriate diabetes management in menopausal women with a history of diabetes mellitus.

DISCUSSION

This study aimed to describe blood glucose levels among menopausal women with a history of diabetes mellitus in the Kabila Health Center area. The findings showed that of the 23 respondents, 12 women (52.2%) had normal blood glucose levels, while 11 women (47.8%) had abnormal blood glucose levels. These results indicate that although the majority of respondents maintained blood glucose levels within the normal range, a substantial proportion continued to experience impaired glycemic control.

The presence of abnormal blood glucose levels among nearly half of the respondents may be associated with physiological and hormonal changes that occur during menopause. Menopause is characterized by the cessation of ovarian function and a decline in estrogen production, which plays an important role in maintaining glucose homeostasis and insulin sensitivity. Reduced estrogen levels contribute to increased visceral fat accumulation, decreased insulin sensitivity, and impaired glucose metabolism, thereby increasing the risk of hyperglycemia and type 2 diabetes mellitus in postmenopausal women [1][2].

The findings of this study are consistent with previous research demonstrating that postmenopausal women tend to have higher blood glucose levels than premenopausal women. Jia et al. [10], reported that both age and menopausal status contribute to increased fasting blood glucose levels, with advancing age exerting an even stronger influence on glycemic status. As women age, physiological changes occur in various organs, including pancreatic β-cells, resulting in decreased insulin

secretion and reduced glucose tolerance. Consequently, postmenopausal women become more susceptible to elevated blood glucose levels and diabetes-related complications.

Another possible explanation for the abnormal blood glucose levels observed in this study is the presence of insulin resistance. Menopause is frequently accompanied by changes in body composition, particularly increased abdominal and visceral fat accumulation. Excess adipose tissue is known to reduce insulin sensitivity and interfere with glucose utilization by peripheral tissues. Studies have shown that central obesity is significantly associated with elevated fasting blood glucose levels among postmenopausal women [11][12]. Therefore, menopausal women with a history of diabetes mellitus may experience greater difficulty maintaining optimal glycemic control due to the combined effects of aging, hormonal changes, and obesity.

The relatively high proportion of respondents with normal blood glucose levels (52.2%) suggests that some participants may have successfully managed their diabetes through medication adherence, dietary regulation, physical activity, and routine health monitoring. Effective diabetes management has been shown to improve glycemic control and reduce the risk of long-term complications. Regular blood glucose monitoring is particularly important among menopausal women because hormonal changes can influence metabolic stability and increase fluctuations in blood glucose levels.

Furthermore, previous studies have indicated that impaired glucose metabolism in postmenopausal women is not solely related to insulin resistance but may also involve deterioration of pancreatic β-cell function. Moleogonekda et al. [13], reported that women with a history of glucose metabolism disorders exhibited significant impairment in β-cell function despite having relatively normal insulin sensitivity. Similarly, Hwu et al. [14], found that reduced β-cell function contributes to glucose intolerance and hyperglycemia in postmenopausal women. These findings suggest that abnormalities in blood glucose levels among menopausal women may result from a complex interaction between hormonal changes, insulin resistance, and impaired insulin secretion.

In addition to metabolic disturbances, uncontrolled blood glucose levels may contribute to other health problems commonly experienced by postmenopausal women. Chronic hyperglycemia has been associated with decreased bone formation, increased bone resorption, and a greater risk of osteoporosis in women with type 2 diabetes mellitus [15][16]. Elevated blood glucose levels have also been linked to reduced muscle strength and impaired physical function, potentially affecting quality of life and independence among older women [17]. Therefore, maintaining optimal glycemic control is essential not only for preventing diabetes complications but also for preserving musculoskeletal health during the postmenopausal period.

The findings of this study emphasize the importance of regular blood glucose screening and comprehensive diabetes management among menopausal women. Early identification of abnormal blood glucose levels allows healthcare providers to implement appropriate interventions, including lifestyle modification, nutritional counseling, physical activity promotion, and pharmacological

management when necessary. Such strategies may help reduce the risk of diabetes-related complications and improve overall health outcomes in postmenopausal women.

Overall, this study demonstrates that although slightly more than half of menopausal women with a history of diabetes mellitus had normal blood glucose levels, a considerable proportion still exhibited abnormal glycemic status. These findings highlight the continued need for monitoring and management of blood glucose levels in this population, particularly given the metabolic changes associated with menopause and aging.

CONCLUSION

This study demonstrated that blood glucose levels among menopausal women with a history of diabetes mellitus in the Kabila Health Center area varied between normal and abnormal categories. Although the majority of respondents exhibited blood glucose levels within the normal range, a substantial proportion continued to experience abnormal glycemic conditions. These findings indicate that menopause and a previous history of diabetes mellitus remain important factors associated with blood glucose regulation and may increase the risk of impaired metabolic control.

Regular blood glucose monitoring and continuous evaluation of diabetes management are therefore essential among menopausal women to support optimal glycemic control and reduce the risk of long-term complications. Health centers are encouraged to strengthen health education, routine screening programs, and lifestyle modification interventions, including dietary management and physical activity promotion, to improve the overall health status of menopausal women with a history of diabetes mellitus.

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