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Gender, age, and body weight of diabetes mellitus among patients visiting community health centers in West Nusa Tenggara: A descriptive study

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Abstract

Background: Diabetes mellitus (DM) is a significant global health issue that has escalated, leading to serious implications for public health. This disease not only increases the risk of long-term health complications but also has a considerable economic impact due to treatment costs and lost productivity. The research findings can inform the development of targeted health policy recommendations and more effective prevention programs.
Purpose: To describe gender, age, and body weight of diabetes mellitus among patients visiting community health centers in West Nusa Tenggara.
Method: A descriptive study design conducted at several community health centers across the province to reflect geographic and demographic diversity and ensure the results represent actual community conditions. The study population included all patients diagnosed with diabetes mellitus at these centers. Data collection involved patient medical records, which provided demographic information such as age and gender, medical history, and laboratory data related to diabetes mellitus.
Results: The age group 57-66 is identified as the most vulnerable, making up 38.19% of the total diabetes patient population. The 47-56 age group also shows a significant risk, with lower risks observed in the 37-46 and 67-76 age groups. Notably, there are no diabetes patients in the 77-86 and 87-96 age groups, indicating a lower risk for these ages. Gender analysis reveals that females are at a higher risk, comprising 75.88% of the diabetes patient population, while males account for only 24.12%. In terms of body weight, individuals in the 50-59 and 60-69 kg weight groups are at high risk, representing 64.82% and 35.18%, respectively, of the total diabetes patients. These findings suggest that individuals weighing over 50 kg have a higher risk of developing diabetes.
Conclusion: The age range of 57-66 is the most vulnerable group to diabetes, with the highest number of patients. Among this group, females tend to be more susceptible to diabetes, especially those with a body weight above 50 kg.

Keywords: Age Group; Body Weight; Diabetes Mellitus; Gender.

INTRODUCTION

Diabetes Mellitus (DM) is a global health issue with a continually increasing prevalence. It is a chronic condition characterized by elevated blood glucose levels (Petersmann, Nauck, Müller-Wieland, Kerner, Müller, Landgraf, & Heinemann, 2018). This condition occurs when the body cannot produce or effectively use insulin. Insulin, a hormone produced by the pancreas, plays a crucial role in regulating blood glucose levels (Schmidt, 2018). In normal circumstances, insulin helps body cells absorb glucose from the blood, utilizing it as an energy source. In individuals with DM, this process is disrupted, leading to poor glucose absorption by body cells. Consequently, blood glucose levels increase,

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causing various health complications. There are several types of DM, with the most common being Type 1 and Type 2. Type 1 occurs when the immune system destroys insulin-producing cells in the pancreas (Campos, Ovares, & Arens, 2020), resulting in insulin deficiency, necessitating external insulin for blood glucose control. On the other hand, Type 2 occurs when the body cannot use insulin effectively or fails to produce sufficient insulin (Galicia-Garcia, Benito-Vicente, Jebari, Larrea-Sebal, Siddiqi, Uribe, & Martín, 2020). Type 2 patients may require oral medication, insulin, or a combination of both (John & John, 2020). Common symptoms of DM include excessive thirst, frequent urination, unintended weight loss, fatigue, and slow wound healing. Long-term complications can involve organ damage such as eyes, kidneys, nerves, and the heart (Henderson, Cagliero, Gray, Nasrallah, Hayden, Schoenfeld, & Goff, 2000).

DM poses serious health risks and can lead to various complications affecting various systems in the body. Major dangers associated with DM include an increased risk of heart disease, stroke, eye disorders, kidney failure, nerve disorders, and circulation problems that can cause infections and difficulty in wound healing (Jiménez, Martín-Carmona, & Hernández, 2020). Heart disease and stroke are related to plaque buildup in blood vessels, which can be accelerated by prolonged high blood glucose levels (Coregliano-Ring, Goia-Nishide, & Rangel, 2022). Preventive measures for DM involve emphasizing a healthy lifestyle. Maintaining a healthy weight, adopting a balanced diet by avoiding high sugar and saturated fat consumption, and ensuring fitness through regular exercise are crucial steps in prevention (Artasensi, Pedretti, Vistoli, & Fumagalli, 2020). Stress management and adequate sleep also play a key role in reducing DM risks. For patients already suffering from DM, treatment aims to control blood glucose levels within a normal range. Management involves regular blood glucose monitoring, adjusting to a healthy diet, and regular physical activity. Type 1 DM patients require external insulin supplementation, while Type 2 patients may need oral medications, insulin, or a combination of both (Schmidt, 2019).

Regular health monitoring is crucial, especially for individuals with high-risk factors such as a family history of DM, obesity, or unhealthy lifestyles, in prevention and management of DM (Galiero, Caturano, Vetrano, Beccia, Brin, Alfano, & Sasso, 2023). Secondary prevention is also necessary, especially for individuals who may have prediabetes or high blood glucose levels but are not yet diagnosed with DM. Additionally, education and psychosocial support are integral parts of DM management. This includes a deep understanding of the influence of lifestyle on the disease, the crucial role of the family in supporting DM patients, and addressing stigma and psychological aspects that may arise. A good understanding of the dangers of DM, prevention, and appropriate treatment can help individuals take necessary steps to minimize risks, maintain quality of life, and reduce the serious impact that can arise from this condition (Craciun, Neag, Catinean, Mitre, Rusu, Bala, & Craciun, 2022; Eskenazi, Rauch, Iurlaro, Gunier, Rego, Gravett, & Papageorghiou, 2022). Therefore, a profound understanding of DM is essential to enable effective prevention, management, and care for those affected by this condition.

The increasing threat of DM worldwide and in Indonesia poses a serious global health challenge requiring serious attention. Major risk factors such as modern lifestyle changes, unhealthy dietary patterns, lack of physical activity, and an increase in obesity levels all contribute to the rising prevalence of DM (Wang, Hess, Hiatt, & Goldfine, 2016). Furthermore, genetic factors and an aging population are also crucial considerations. Globally, the World Health Organization (WHO) notes a significant increase in DM prevalence in recent decades (Liu, Ren, Qiang, Wu, Shen, Zhang, & Lyu, 2020). This not only directly threatens individuals but also imposes a substantial economic burden on public health systems. Increased urbanization, overweight conditions, and dietary habits dominated by high sugar and fat foods are major driving factors in many countries. In Indonesia, DM is also becoming an increasingly alarming public health issue. Economic growth and lifestyle changes have negatively impacted eating patterns and physical activity levels among the population. DM prevalence in Indonesia continues to rise, followed by the risk of complications such as heart disease, kidney disorders, and other health problems (Darenskaya, Kolesnikova, & Kolesnikov, 2021).

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Genetic factors and the prevalence of obesity in society also contribute to this issue (Ngoatle, & Mothiba, 2022).

The increasing threat of DM is not limited to health aspects but also poses a serious economic impact. Long-term treatment and care for DM patients require substantial resources and can burden national healthcare systems (Tomic, Shaw, & Magliano, 2022). Therefore, preventive efforts become increasingly important. Preventive measures at the individual and population levels need to be strengthened through health education, promotion of a healthy lifestyle, and improved access to Health Care facilities (Poznyak, Grechko, Poggio, Myasoedova, Alfieri, & Orekhov, 2020). Government initiatives to encourage public policies that support healthy food and open spaces for physical activity are strategic steps in responding to the DM threat. West Nusa Tenggara Province, as part of Indonesia, also faces similar challenges with the increasing number of individuals affected by diabetes.

One crucial aspect to consider is the difference in the incidence of DM based on gender. Previous studies have shown that the prevalence patterns of DM can vary between men and women and may be influenced by biological and social factors (Richardson & Park, 2021). Therefore, gender-based analysis becomes essential in understanding the risk differences between male and female populations in West Nusa Tenggara Province. Additionally, age groups are also critical factors in DM risk. Previous research indicates that this risk tends to increase with age (Sweeting, Wong, Murphy, & Ross, 2022). An analysis that considers age groups can provide further insights into trends and risk differences across various age ranges in this province. Body weight also has a significant impact on DM risk. Obesity is known as a major adverse condition, but an imbalanced distribution of body weight can also contribute to increased disease risk (Kim & Kim, 2022). Therefore, this research will also involve body weight analysis as an additional adverse condition.

Previous studies have demonstrated that factors such as gender, age group, and body weight are linked to an individual's risk of developing DM (Mauri-Obradors, Estrugo-Devesa, Jané-Salas, Viñas, & López-López, 2017; Szmuilowicz, Josefson, & Metzger, 2019; Zhu & Qu, 2022). This research aims to offer a comprehensive overview of the adverse condition for DM in West Nusa Tenggara Province, focusing on differences in gender, age group, and body weight. The findings are expected to lay the groundwork for developing more targeted and effective prevention strategies, thereby enhancing our understanding of DM epidemiology at the regional level.

RESEARCH METHOD

A descriptive study design conducted for DM patients at community health centers throughout West Nusa Tenggara Province. This design allows for a comprehensive overview of the variability and dynamics of DM incidence in the region. The research spanned several community health centers across the province, ensuring adequate representation of the DM patient population. Health centers were selected carefully, taking into account geographic and demographic diversity to ensure the results accurately reflect community conditions. The study population included all patients diagnosed with DM at these centers, with a sample size of 199 patients chosen to provide statistically significant results. Data collection involved patients' medical records, which include demographic information such as age and gender, medical history, and laboratory data related to DM. Additionally, patients' body weight was directly measured during the research.

The main variables in this study are DM status as the dependent variable, and gender, age group, and body weight as independent variables. Other variables such as family history, lifestyle, and physical activity are also recorded when available and relevant. The research strictly adheres to ethical standards, ensuring the privacy and confidentiality of patient data, and patient participation is voluntary with clear information provided about the research objectives.

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RESEARCH RESULTS

Table 1. Characteristics of the Respondents (N=199)

Variable	Gender	
	Male (n=48)	Female (n=151)
Age (n/%)		
(Mean±SD)(Range)(Year)	(57.58±10.135)(37-86)	(58.32±11.032)(37-96)
37-46 years	6/12.5	15/9.9
47-56 years	14/29.1	52/34.4
57-66 years	21/43.8	55/36.4
67-76 years	6/12.5	19/12.6
77-86 years	1/2.1	7/4.6
87-96 years	0/0.0	3/2.1
Body Weight (n/%)		
50-59 Kg	33/68.8	96/63.6
60-69 Kg	15/31.2	55/36.4

Table 1 indicates that male respondents have an average age of 57.58 with a standard deviation of 10.135, spanning an age range of 37 – 86 years. The largest proportion of male respondents, 43.8%, falls within the 57 – 66 age group. On the other hand, female respondents have an average age of 58.32 with a standard deviation of 11.032, covering an age range of 37 – 96 years. Among female respondents, the majority, 36.4%, are in the 57 – 66 age group, followed by 34.4% in the 47 – 56 age group.

Among male respondents, 68.8% have a body weight predominantly in the 50-59 kg range. Similarly, 63.6% of female respondents also mostly weigh between 50-59 kg.

The analysis of data on diabetes patients presents a varied picture regarding the risk of diabetes based on age, gender, and weight range. Age-wise, there is considerable variation among different groups. The 57-66 age group has the highest risk, with 76 diabetes patients, making up 38.19% of the total. The 47-56 age group also shows a significant risk, with 66 patients or 33.17%. Lower risks are observed in the 37-46 and 67-76 age groups, with 21 and 25 patients, respectively. Notably, no diabetes patients were found in the 87-96 age group, indicating a lower risk for ages 77-86 and 87-96. Regarding gender, females exhibit a higher risk, with 151 patients (75.88%) compared to 48 male patients (24.12%), highlighting a gender disparity in diabetes prevalence. Analyzing weight groups, the 50-59 kg range has the highest number of diabetes patients, accounting for 64.82% (129 patients). The 60-69 kg range follows with 70 patients, or 35.18%, suggesting a higher diabetes risk for individuals weighing over 50 kg. Overall, this analysis indicates that age, gender, and weight significantly influence diabetes risk in the studied population, suggesting that targeted prevention and management strategies should focus on these high-risk groups to reduce the disease's impact.

DISCUSSION

The analysis of data from diabetes patients reveals notable differences across age, gender, and weight categories. The age bracket of 57-66 demonstrates the highest susceptibility, encompassing 38.19% of the overall population, followed by the 47-56 age group with a risk of 33.17%. In contrast, the 87-96 age group shows a lower susceptibility, with no diabetes cases reported in this range. Age plays a pivotal role in determining diabetes risk, influenced by physiological changes and lifestyle factors that become increasingly significant with

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advancing age (Zeyfang, Zeeh, Bahrmann, Kugler, & Heppner, 2021). One major mechanism is insulin resistance, a condition in which body cells do not respond effectively to insulin, as seen in younger individuals (Kim, Harrall, Glueck, Needham, & Dabelea, 2022). With age, the body tends to experience increased insulin resistance, leading to elevated blood glucose levels and eventually contributing to the development of type 2 diabetes (Choi & Shi, 2001). Additionally, the pancreas, responsible for insulin production, may undergo decreased function with age (Indrahadi, Wardana, & Pierewan, 2021). Lower or less effective insulin production can contribute to blood sugar imbalance and an increased risk of diabetes. Changes in body composition also commonly occur with aging, including increased fat and decreased muscle mass (Huang, Wu, Zhang, Lin, Shen, Zhao, & Yan, 2022). Excess fat, especially around the abdomen, can trigger insulin resistance, thus enlarging the risk of diabetes. Age can also impact the level of physical activity, which tends to decline over time. Insufficient physical activity can contribute to weight gain, insulin resistance, and an increased risk of diabetes (Zeyfang, Wernecke, & Bahrmann, 2023). Additionally, genetic factors may play a role in increasing predisposition to diabetes with age, especially with a family history of diabetes. Chronic conditions often associated with old age, such as high blood pressure and heart disease, can also elevate diabetes risk (Evangelista, Maia, Toledo, Abreu, & Barreira, 2020). The interplay of all these factors creates an environment supportive of diabetes development in older age. With a profound understanding of age-related adverse condition, prevention and management efforts for diabetes can be more precisely targeted, especially in the elderly population. Health education and healthy lifestyle campaigns can be effective strategies to reduce diabetes risk among this age group, focusing on lifestyle changes, regular health monitoring, and healthy weight management (Su, Huang, Yin, Lyu, Ma, & Tao, 2023; Zeyfang et al., 2023).

Data also indicates that females have a higher risk (75.88%) compared to males (24.12%). This difference reflects varying occurrence patterns between genders, suggesting a tendency for females to be more vulnerable to diabetes in this sample. Further interpretation may involve exploring hormone-related factors or specific adverse condition in females that can be identified to guide more effective disease prevention and management efforts. Females have a higher risk of developing diabetes, and this phenomenon involves the interaction of various biological and hormonal factors playing a significant role in the complex relationship between gender and diabetes (Esposito, Chiodini, Capuano, Petrizzo, Improta, & Giugliano, 2012). One significant factor is the role of hormones, especially estrogen and progesterone dominating in women. Fluctuations in these hormones, such as during the menstrual cycle, pregnancy, and menopause, can affect the body's insulin sensitivity, thus increasing the risk of insulin resistance and diabetes (Ciarambino, Crispino, Leto, Mastrolorenzo, Para, & Giordano, 2022). Different eating habits between men and women can also contribute to differences in diabetes risk (Santos, Santos, Ferrari, Fonseca, & Ferrari, 2014). Women tend to consume diets with higher sugar and fat content, increasing the risk of insulin resistance. Furthermore, significant weight changes during pregnancy can affect the risk of gestational diabetes, subsequently increasing the risk of type 2 diabetes in the future (Milionis, Ilias, Venaki, & Koukkou, 2023). Differences in body composition are also a factor, with women tending to have a higher proportion of body fat. Excess fat, especially around the hips and thighs, can contribute to insulin resistance and an increased risk of diabetes. Genetic factors also play a role, with research suggesting that different genetic factors may have a greater impact on women in diabetes development. The influence of hormonal changes during menopause, especially a decrease in estrogen levels, can also affect insulin sensitivity and increase diabetes risk in women after menopause (Esposito et al., 2012; Sananta, Zahrah, Widasmara, & Fuzianingsih, 2022). Therefore, a deep understanding of these differences can help develop more specific prevention and management strategies for women's health. Prevention measures involving weight monitoring, healthy eating patterns, and regular physical activity can be effective steps in reducing diabetes risk in the female population (Deischinger, Dervic, Leutner, Kosi-Trebotic, Klimek, Kautzky, & Kautzky-Willer, 2020; Elfianti, Tosepu, & Effendy, 2022). When looking at weight groups, individuals

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with weights between 50-59 and 60-69 show higher risks, at 64.82% and 35.18%, respectively. This indicates that weight within these ranges significantly impacts the occurrence of diabetes in this sample. Therefore, prevention strategies focusing on weight management and promoting a healthy lifestyle may be necessary to reduce diabetes risk among this population. Weight plays a crucial role in determining the risk of diabetes, and the relationship between weight and diabetes reflects the interconnectedness of obesity and insulin resistance (Bays, 2023). Increased weight can lead to changes in the body's metabolism, affecting how the body uses insulin to manage blood sugar (Jang, Kim, & Kim, 2022). Some mechanisms involved in this correlation are as follows: First, obesity is often associated with insulin resistance, where body cells become less responsive to insulin (Henderson, Cagliero, Gray, Nasrallah, Hayden, Schoenfeld, & Goff, 2000). Insulin resistance makes it difficult for the body to regulate blood sugar, thereby increasing the risk of type 2 diabetes. Additionally, accumulated fat in adipose tissue, especially around the abdomen, can produce inflammatory compounds that can exacerbate insulin resistance and damage the pancreatic beta cells that produce insulin. Second, obesity can lead to increased production of adipocyte hormones, such as adiponectin and leptin, which can affect blood sugar regulation (Sanabria-Martínez et al., 2015). Imbalances in these hormones can disrupt blood sugar homeostasis and increase diabetes risk. Furthermore, excess weight can trigger an imbalance in the production of proinflammatory cytokines, such as TNF-α (tumor necrosis factor-alpha) and IL-6 (interleukin-6), which can contribute to chronic inflammation. This chronic inflammation can also damage pancreatic beta cells and worsen insulin resistance (Dvořák & Souček, 2022). Visceral fat, located around internal organs, is more closely associated with diabetes risk than subcutaneous fat beneath the skin. Visceral fat is more active in producing inflammatory compounds and increasing hormonal imbalances, which can then worsen insulin resistance. As weight increases, especially in the context of obesity, the risk of type 2 diabetes also increases (Ling, Bacos, & Rönn, 2022; Goddard, Oxlad, & Turnbull, 2023). Therefore, emphasis on weight management through a healthy lifestyle, balanced diet, and regular physical activity is crucial in preventing diabetes, especially type 2 diabetes. Prevention and management of obesity can play a vital role in reducing diabetes risk and improving overall public health.

This analysis indicates that factors such as age, gender, and weight have a significant impact on diabetes risk in the studied patient population. Therefore, diabetes prevention and management strategies need to be specifically developed for these risk groups. These efforts may include more targeted health education campaigns, promotion of healthy lifestyles, and prevention programs tailored to the characteristics of identified risk groups (Zhao, Song, Zhang, Zhen, Song, & Ma, 2018; Rhee, 2022). With a better understanding of the factors influencing diabetes incidence, interventions can be designed more effectively to enhance public health (Suryasa, Rodríguez-Gámez, & Koldoris, 2021). In response to these findings, holistic solutions can be implemented. Public education and awareness about diabetes risks, especially in vulnerable age groups, can improve understanding and change behavior (Su et al., 2023). Regular diabetes screenings and check-ups, especially in the female population, can help detect conditions early (Choi & Shi, 2001). Focused weight management programs, including increased physical activity and nutritional education, can provide benefits in reducing diabetes incidence among populations prone to a specific weight range (Chia, Egan, & Ferrucci, 2018). Further research can be conducted to understand specific factors leading to diabetes tendencies in women and certain age groups, allowing for more targeted prevention strategies to be developed. Therefore, the implementation of these solutions requires collaboration among healthcare providers, governments, and the community to create an environment supporting diabetes prevention and management efforts, with the hope of reducing the burden of this disease at the population level.

CONCLUSION

The age group 57-66 is identified as the most vulnerable, making up 38.19% of the total diabetes patient population. The age group 47-56 also shows a high risk, followed by lower risks in the 37-46 and 67-76 age groups. Notably, there are no diabetes patients in the 77-86 and 87-96 age groups, indicating

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a lower risk in these categories. Gender analysis highlights that females are at higher risk, representing 75.88% of the diabetes patient population, while males account for only 24.12%, showing a significant difference in diabetes prevalence between genders. Regarding weight, individuals in the 50-59 and 60-69 kg weight groups are at high risk, comprising 64.82% and 35.18%, respectively, of the total diabetes patients. This suggests that individuals weighing over 50 kg have a higher risk of developing diabetes.

RECOMMENDATIONS

Based on these findings, further research is recommended to investigate the factors contributing to the prevalence of diabetes in specific age and gender groups. Future studies could explore genetic components, hormonal influences, and lifestyle habits to better understand the predisposition to diabetes in this population.

For the Health Department, it is recommended to develop targeted diabetes education and prevention programs, particularly for high-risk age and gender groups. Increasing public awareness about healthy lifestyles and the importance of regular health check-ups can help mitigate the burden of diabetes. Strengthening routine screening programs and making healthcare services more affordable are essential for early detection of diabetes cases.

For the government, prioritizing health policies that enhance healthcare accessibility and improve community quality of life is crucial. Investing in healthcare facilities and trained personnel can improve the prevention, diagnosis, and management of diabetes. Additionally, fostering cross-sectoral collaboration among the government, health institutions, and the education sector can create an environment that promotes healthy living and offers sustainable solutions to diabetes-related issues in the community.

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