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Research Article

Fatigue Characteristics in Patients with Type 2 Diabetes Mellitus and Diabetic Ulcer Complications

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Abstract. Introduction: Fatigue is a common complaint in individuals with type 2 DM accompanied by diabetic ulcers due to metabolic disorders, chronic pain, and limited activity. This condition can last for a long time and have an impact on the patient's physical and psychological function. This study aims to describe the characteristics of Fatigue in patients with type 2 diabetes mellitus who experience complications of diabetic ulcers. Methodology: This study used an analytical descriptive design with a cross-sectional approach, involving 133 respondents as a sample obtained through purposive sampling techniques. The research instrument used Multidimensional Fatigue Inventory-20 (MFI-20). Data analysis was carried out descriptively using frequency distribution and descriptive statistics. Results: The mean age of the respondents was 57.64 years (95% CI 56.63–58.65). Most of the respondents were female (55.6%), had diabetes for more than 5.56 years, had a junior high school education level (31.6 %), and the majority of the job types did not work (27.8%). As many as 72.9% of respondents experienced Fatigue . Discussion: The characteristics of type 2 diabetes mellitus patients with diabetic ulcers who experience Fatigue show variations based on age, sex, education level, type of occupation, and length of illness. The condition of diabetic ulcers contributes to increased Fatigue through limited mobility, pain, and psychological stress.

Keywords: Diabetes Melitus; Fission Activity; Multidimensional Fatigue; Psychological Function; Ulcer Diabetic

1. Background

Diabetes Mellitus (DM) is a long-term metabolic disorder whose prevalence is increasing worldwide (Rosaline et al., 2025). According to WHO data, approximately 422 million people are affected by DM, with the death rate reaching 1.5 million people each year (WHO, 2021). The International Diabetes Federation states that Indonesia is ranked fifth as the country with the highest number of diabetes mellitus sufferers in the world (Senaputra et al., 2024). At the national level, the 2023 Indonesian Health Profile recorded 6,226 cases of DM (Kementrian Kesehatan Republik Indonesia, 2023), while in Central Java Province DM ranks third among non-communicable diseases with a proportion of 9.59% (Central Java Health Office, 2023). In Semarang City alone, 40,483 DM patients have received standard health services (Retnoningrum et al., 2024).

Type 2 diabetes is the most common type of diabetes in the community and often develops into chronic complications. Among the complications of diabetes that often appear are diabetic ulcers, which are chronic wounds on the lower extremities that occur due to peripheral neuropathy and vascular disorders, resulting in a slow healing process and a high risk of infection and amputation (Abid & Hosseinzadeh, 2024). This complication not only reduces physical function, but also impacts the psychological and social conditions of sufferers.

One of the most common complaints experienced by DM patients with diabetic ulcers is *fatigue* . *Fatigue* is a subjective state of exhaustion encompassing physical, mental, and emotional aspects that does not improve with rest (Sanjana et al., 2022). In DM patients, *fatigue* is influenced by metabolic disorders, poor glucose control, and the presence of chronic

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complications such as neuropathy and diabetic ulcers. Insulin resistance prevents glucose from being optimally utilized by the body's cells, resulting in a state of "cellular starvation" that triggers energy deficits and prolonged fatigue (Nursiswati et al., 2023).

Fatigue experienced by DM patients has a significant impact on daily activities, motivation, and the ability to perform self-care. This condition contributes to decreased therapy adherence and overall patient well-being (Nursiswati et al., 2023). Ricky dan Wulandari (2024) reported that most DM patients experience high levels *of fatigue* . Singh and Kluding (2013) and Jain et al. (2015), cited by [1], (Nursiswati et al., 2023)also showed that *fatigue levels* in DM patients were significantly higher than in the healthy population.

In patients with diabetic ulcers, the burden *of fatigue* is even greater. Chronic, difficult-to-heal wounds cause prolonged pain, limited mobility, a risk of infection, and high emotional distress. These conditions cause patients with diabetic ulcers to experience more complex and multidimensional *fatigue* than patients with uncomplicated diabetes.(Abid & Hosseinzadeh, 2024).

Fatigue in DM patients is related to various individual characteristics, such as age, gender, duration of the disease, education level, and co-existing clinical conditions. These characteristics interact with the diabetic ulcer, creating different *fatigue patterns* in each patient. Therefore, understanding the characteristics of *fatigue* is essential as a basis for planning more individualized and holistic nursing interventions.

A preliminary study conducted at the Outpatient Unit of Sultan Agung Islamic Hospital in Semarang from March to May 2025 identified 201 individuals with type 2 diabetes and diabetic ulcers undergoing treatment. Interviews revealed that most patients experienced physical and mental fatigue, which disrupted their activities, reduced motivation, and affected their psychological well-being. *The fatigue* experienced was not only physical but also emotional and psychosocial.

Given the high incidence of type 2 diabetes, the significant impact of diabetic ulcer complications, and the complexity *of fatigue* experienced by patients, research specifically describing the characteristics *of fatigue is needed* . The results of this study are expected to form the basis for developing more structured and comprehensive nursing interventions for type 2 diabetes patients with deep diabetic ulcers to improve the quality of care and patient well-being.

2. Theoretical Study

Fatigue in Diabetes Mellitus Patients

Fatigue is a subjective state of physical, mental, and emotional exhaustion that does not improve with rest. In patients with type 2 diabetes, *fatigue* occurs due to impaired energy metabolism, poor glucose control, chronic inflammation, and disease complications (Sanjana et al., 2022). Insulin resistance prevents glucose from being properly absorbed by cells, resulting in an energy deficit, leading to prolonged fatigue (Nursiswati et al., 2023).

Fatigue in DM Patients with Diabetic Ulcers

In individuals with diabetes mellitus and diabetic ulcers, *fatigue* becomes more complex and multidimensional. Chronic, difficult-to-heal wounds cause persistent pain, activity limitations, sleep disturbances, and psychological stress. These conditions exacerbate *fatigue* and impact the patient's ability to perform daily activities, adherence to therapy, and overall well-being (Schilrreff & Alexiev, 2022).

Characteristics That Influence Fatigue

Fatigue in people with type 2 diabetes and diabetic wound complications is influenced by various individual characteristics, such as age, gender, education level, type of employment, and duration of diabetes. Advanced age and long disease duration increase the risk of complications and fatigue (Safari, 2023). Education and employment are associated with self-care skills and physical activity, which also influence *fatigue levels.* (Handayani et al., 2023). Understanding the characteristics of *Fatigue* is important as a basis for planning holistic and individual nursing interventions.

3. Research Methods

The research design used was descriptive analytical with a cross-sectional approach, with a population consisting of type 2 DM patients with diabetic ulcers in the Outpatient Unit of Sultan Agung Islamic Hospital Semarang. A total of 133 respondents The research sample was obtained through purposive sampling by considering the predetermined inclusion criteria. The data collection procedure was carried out by filling out a questionnaire

during the research period. The main instrument used to measure the level of fatigue was the MFI-20 questionnaire, while the demographic data questionnaire was used to identify the characteristics of the respondents consisting of age, gender, education level, type of employment, and duration of suffering from the disease. The collected data were processed using a computer program to ensure the accuracy of the analysis. Research ethics were maintained by upholding the principles of self-determination, privacy, anonymity, confidentiality, and justice. Through univariate analysis, the frequency distribution of each research variable can be presented systematically.

4. Results And Discussion

Table 1Sultan Agung Islamic Hospital Semarang in July-September (n=133).

Variables	Mean ± SD	Median	Min	Max	CI 95% (Lower-Upper)
Age	57.64 ± 5.890	57.00	43	69	56.63– 58.65
Long Suffering	5.56 ± 3.108	5.00	1	15	5.02–6.09

The results of the analysis in Table 1. showed that the average age of respondents was 57.64 years (SD ± 5.890) with a median of 57 years, the youngest age was 43 years and the oldest age was 69 years. The 95% confidence interval range was 56.63 to 58.65 years. Meanwhile, the average duration of diabetes mellitus in respondents was 5.56 years (SD ± 3.108) with a median of 5 years, the duration of suffering was in the range of 1 to 15 years, with a 95% confidence interval between 5.02 to 6.09 years.

Table 2 Frequency Distribution of Respondents Based on Gender, Education Level, Type of Occupation, *Fatigue in DM Patients with Diabetic Ulcers at* Sultan Agung Islamic Hospital Semarang in July-September (n=133).

Variables	Frequency (n)	Percentage (%)
Gender		
Man	59	44.4%
Woman	74	55.6%
Total	133	100
Education		
No school	5	3.8%
Elementary School	14	10.5%
JUNIOR HIGH SCHOOL	42	31.6%
SENIOR HIGH SCHOOL	37	27.8%
College	35	26.3%
Total	133	100
Type of work		
Doesn't work	37	27.8%
Housewife	32	24.1%
Informal workers (laborers, farmers, traders)	25	18.8%
Employees (civil servants/private employees)	16	12.0%
Other	23	17.3%
Total	133	100
Fatigue		
There is *Fatigue*	97	72.9%
No *Fatigue*	36	27.1%
Total	133	100

Based on the research results, the majority of respondents were female (55.6%), with the highest educational level at junior high school (31.6%). Based on occupation, the majority of respondents were unemployed (27.8%) and housewives (24.1%).

A total of 97 respondents (72.9%) experienced *fatigue* , while 36 respondents (27.1%) did not experience *fatigue* . These findings indicate that the majority of type 2 diabetes mellitus patients with diabetic ulcer complications exhibit significant fatigue.

Age

The average age of respondents was 57.64 years, indicating that the majority were in the early elderly group. Advanced age is a major risk factor for diabetes mellitus and its complications due to decreased pancreatic function, insulin sensitivity, and metabolic

capacity (Cahyani et al., 2024). The aging process also reduces peripheral circulation, increasing the risk of diabetic ulcers and worsening wound healing (Zubir et al., 2024). Furthermore, impaired energy metabolism in the elderly contributes to increased *fatigue* and a decreased quality of life (Rahmawati & Purwanti, 2023).

Gender

The majority of respondents were women (55.6%), who are known to have a greater risk of diabetes mellitus and *fatigue* due to hormonal influences, especially the decline in postmenopausal estrogen which affects insulin sensitivity (Samapati et al., 2023). Lower physical activity and higher insulin resistance in women also increase the risk of diabetic ulcer complications (Detty et al., 2020). In addition, women are more susceptible to *fatigue* due to a combination of biological, psychological, and social factors (Febriandhika et al., n.d.). These findings indicate that the quality of life in this group is lower than in men, especially in the physical and psychological domains. (Putri, 2020).

Education Level

The majority of respondents had a junior high school education (31.6%). Low education is associated with low health literacy, medication adherence, and self-care skills, thus increasing the risk of complications and *fatigue.* (Plenti et al., 2025)Individuals with low education tend to have a poor understanding of glycemic control and wound care, which slows the healing of diabetic ulcers (Susanti et al., 2024). Conversely, higher education contributes to disease management skills associated with changes in patients' quality of life (Handayani, 2023).

Type of Job

Most respondents were unemployed (27.8%). Unemployment is associated with low physical activity, which leads to decreased insulin sensitivity and impaired peripheral circulation (Sugi et al., 2024). Low physical activity slows wound healing and increases the risk of diabetic ulcers (Lontoh et al., 2020). Furthermore, psychological stress in unemployed individuals increases cortisol levels, which are antagonistic to insulin, thus worsening glycemic control and increasing *fatigue.* (Nugroho & Musdalifah, n.d.).

Long Suffering

The average duration of diabetes among respondents was 5.56 years. Long disease duration increases the risk of vascular complications and neuropathy, which can lead to diabetic ulcers (Amalia et al., 2024). Chronic hyperglycemia causes microangiopathy, which impedes peripheral blood flow, thus slowing wound healing. Longer duration is also associated with increased *fatigue* and a decreased quality of life. However, patients with short disease duration can also experience a poor quality of life if they are unable to adapt and perform optimal self-care.(Paris et al., 2023).

Fatigue

As many as 72.9% of respondents experienced *fatigue* . *Fatigue* in diabetic patients with diabetic ulcers is influenced by blood glucose imbalance, chronic wound inflammation, and psychological disorders (Sutawardana et al., 2022). The inflammatory process increases proinflammatory cytokines that contribute to systemic fatigue (Schilrreff & Alexiev, 2022). In addition, anxiety, depression, and sleep disorders exacerbate *fatigue* and accelerate the decline in quality of life (Handayani et al., 2023). *Fatigue* is multidimensional and often not physically visible, but significantly affects the patient's functional abilities (Noor, 2018).

5. Conclusion And Suggestions

Conclusion

Fatigue is common in individuals with type 2 diabetes mellitus complicated by diabetic ulcers . *Fatigue* is often experienced by early elderly respondents, with women being the most prevalent group. Long-term diabetes, activity limitations due to wounds, and psychological conditions also contribute to the increased incidence of *fatigue* in patients.

Suggestion

Efforts are needed to increase knowledge and promote behavioral changes in type 2 diabetes mellitus patients with diabetic ulcers, including regular blood sugar monitoring, proper wound care, and light physical activity according to ability. Furthermore, patients are expected to manage stress and maintain a healthy lifestyle to minimize *fatigue* and improve quality of life.

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