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Relationship between Wound Severity, Discomfort, and Psychological Problems in Patients with a Diabetic Foot Ulcer in Indonesia: A Cross-sectional Study*

Theme: Chronic care.

Contribution to the discipline: This study provides essential data to understand the factors that may affect wound severity. Thus, nurses can use it to consider the psychological aspect of wound care.

ABSTRACT

Objectives: The purpose of this study is to identify the relationship between wound severity, discomfort, and psychological problems in patients with a diabetic foot ulcer in Indonesia. **Methods:** A cross-sectional study is conducted in three general hospitals and one clinic in Indonesia. The Bates-Jensen wound assessment tool (BWAT), the discomfort evaluation of wound instrument (DEWI), and the depression, anxiety, and stress scale (DASS) are used to measure the variables of interest. Path analysis is performed to evaluate the association between wound severity, discomfort, and psychological problems. **Results:** Of 140 patients with diabetic foot ulcers who joined this study, the majority experienced immobilization (74.3%), pain (69.3%), and sleep disturbance (63.6%). The means were as follows: discomfort

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(2.35 ± 0.33), depression (1.34 ± 0.41), stress (1.49 ± 0.48), anxiety (1.43 ± 0.40), and wound severity (31.35 ± 9.96). Discomfort partially mediated the relationship between wound severity and psychological problems, which indirect effect was 0.11. **Conclusion:** High prevalence of discomfort, both physical and psychological, was found in patients with a diabetic foot ulcer. Discomfort mediates the relationship between wound severity and psychological problems. Integrating comfort into wound care management may help to reduce the psychological burden.

KEYWORDS (SOURCE: DECS)

Chronic wound; diabetic foot ulcer; discomfort; psychological problems; wound severity.

Relación entre la gravedad de la herida, la molestia y los problemas psicológicos en pacientes con úlcera del pie diabético en Indonesia: estudio transversal*

RESUMEN

Objetivos: el presente estudio tiene como objetivo identificar la relación entre la gravedad de la herida, la molestia y los problemas psicológicos en pacientes con úlcera del pie diabético en Indonesia. **Métodos:** se realizó un estudio transversal en tres hospitales generales y una clínica de Indonesia. La herramienta de evaluación de heridas Bates-Jensen (BWAT, por sus siglas en inglés), el instrumento de evaluación de molestia de la herida (DEWI, por sus siglas en inglés) y la escala de depresión, ansiedad y estrés (DASS, por sus siglas en inglés) se utilizaron para medir las variables de interés. Se realizó un análisis de ruta para evaluar la asociación entre la gravedad de la herida, la molestia y los problemas psicológicos. **Resultados:** de 140 pacientes con úlcera del pie diabético que participaron en este estudio, la mayoría experimentó inmovilización (74,3 %), dolor (69,3 %) y trastornos del sueño (63,6 %). Las medias fueron las siguientes: molestia ($2,35 \pm 0,33$), depresión ($1,34 \pm 0,41$), estrés ($1,49 \pm 0,48$), ansiedad ($1,43 \pm 0,40$) y gravedad de la herida ($31,35 \pm 9,96$). La molestia medió en parte la relación entre la gravedad de la herida y los problemas psicológicos, cuyo efecto indirecto fue de 0,11. **Conclusión:** se encontró una alta prevalencia de molestias, tanto físicas como psicológicas, en pacientes con úlcera del pie diabético. Además, la molestia media la relación entre la gravedad de la herida y los problemas psicológicos. La integración de la comodidad en el manejo del cuidado de las heridas puede ayudar a reducir la carga psicológica.

PALABRAS CLAVE (FUENTE: DeCS)

Herida crónica; úlcera de pie diabético; molestia; problemas psicológicos; gravedad de la herida.

* Este artículo es derivado de una tesis doctoral.

Relação entre gravidade da ferida, desconforto e problemas psicológicos em pacientes com úlcera diabética do pé na Indonésia: um estudo transversal*

RESUMO

Objetivos: o objetivo deste estudo é identificar a relação entre a gravidade da ferida, o desconforto e os problemas psicológicos em pacientes com úlcera do pé diabético na Indonésia. **Métodos:** foi realizado um estudo transversal em três hospitais gerais e uma clínica da Indonésia. A ferramenta da avaliação de feridas Bates-Jensen (BWAT, por sua sigla em inglês), o instrumento de avaliação do desconforto da ferida (DEWI, por sua sigla em inglês) e a escala de depressão, ansiedade e estresse (DASS, por sua sigla em inglês) foram utilizados para medir as variáveis de interesse. Uma análise de rota foi realizada para avaliar a associação entre a gravidade da ferida, o desconforto e os problemas psicológicos. **Resultados:** de 140 pacientes com úlcera diabética do pé que participaram deste estudo, a maioria experimentou imobilização (74,3 %), dor (69,3 %) e transtornos do sono (63,6 %). As médias foram: desconforto ($2,35 \pm 0,33$), depressão ($1,34 \pm 0,41$), estresse ($1,49 \pm 0,48$), ansiedade ($1,43 \pm 0,40$) e gravidade da ferida ($31,35 \pm 9,96$). O desconforto foi o mediador em parte da relação entre a gravidade da ferida e os problemas psicológicos, cujo efeito indireto foi de 0,11. **Conclusões:** verificou-se alta prevalência de desconforto, tanto físico quanto psicológico, em pacientes com úlcera diabética do pé. Além disso, o desconforto intermedeia a relação entre a gravidade da ferida e os problemas psicológicos. A integração do conforto na gestão do cuidado das feridas pode ajudar a reduzir a carga psicológica.

PALAVRAS-CHAVE (FONTE: DECS)

Ferida crônica; úlcera diabética do pé; desconforto; problemas psicológicos; gravidade da ferida.

* Este artigo é derivado de uma tese de doutorado.

Introduction

Diabetes mellitus (DM) is a significant public health issue and a socioeconomic burden in Indonesia. In 2019, approximately 463 million adults around the world had diabetes; it is estimated to increase to 700 million by 2045 (1). About 79 % of adults with diabetes lived in low- and middle-income countries (1). Indonesia is ranked as having the seventh-largest number of DM patients in the world, and the number of people with diabetes was 10.7 million (6.2 %) of the total population in 2019 (1). DM caused 4.2 million deaths and at least USD 760 billion in health expenditure in 2019—10 % of total spending on adults (1). Diabetic foot complications constitute a major health burden, amounting to the single most substantial reason for hospitalization among diabetic patients. Up to 2–3 % of DM patients are thought to have an active foot ulcer with a lifetime risk of developing complications (2, 3). The International Diabetes Federation states that 9.1 to 26.1 million people with diabetes will suffer from a diabetic foot ulcer (DFU) each year (4, 5).

DFU is described as a full-thickness lesion appearing on the skin on the feet of people with diabetes, along with infection, and destruction of tissues due to neuropathy or peripheral artery disease (PAD) (6). Concerning long-term conditions, a DFU may ultimately prompt lower extremity amputation (LEA), thus reducing patients' quality of life (7). DM had increased 11 times the incidence of foot ulcers, accounted for more than 80 % of all amputations, and risen hospital costs more than 10-fold (8–10). Most DFUs are asymptomatic at the beginning, and patients start to recognize it until non-healing ulcers become evident (11). Therefore, wound healing becomes longer and cause high medical costs. The improvement, innovation, and prevention agenda further highlights the need for better efforts on active chronic disease management to optimizing the utilization of healthcare resources.

The previous study reported that discomfort due to a DFU is the most common complaint among patients and significantly impacts the wound healing process (12). Discomfort refers to the attributes of communication, family and relationship, functionality, self-identity, physical and psychosocial symptom relief, spiritual activities and states, safety and security (13). Discomfort means unfulfilled human basic needs individually and holistically (14). Pain, stress, bad smell, sleep disorder, and daily activities disturbances were the most common complaints by patients with a DFU (11, 12). Previous studies reported that feeling discomfort could affect the wound healing process (14, 15). However, discomfort

receives less attention from health care providers. Therefore, achieving a good quality of wound care requires that the nurse care for patients physically and psychologically. The purpose of this study is to explore wound severity, discomfort, and psychological problems (stress, anxiety, and depression) and its interaction in patients with a DFU.

Methods

Study design

The cross-sectional study design was employed to explore wound severity, discomfort, and psychological problems of patients with a DFU. This study was conducted at the inpatient of three public hospitals in Jakarta and one wound care clinic in Indonesia from January 2018 to September 2018. The hospitals in Jakarta take care of 300–350 DM patients (with or without DFUs) daily.

Participants

The study sample consisted of 140 patients with a DFU. The sample size was calculated using a rule of thumb, namely, 5 to 50 respondents for each variable being researched (16). The inclusion criteria were patients with a DFU, having a stable hemodynamic status, able to communicate in Bahasa, and willing to be respondents. A convenience sampling technique was used to select the participants.

Measures

Demographic characteristics and clinical information were collected, including age, gender, education level, marital status, working status, monthly income, body mass index, duration of the DFU, type of wound dressing, and smoking status.

The Bates-Jensen wound assessment tool (BWAT) was used to measure a chronic wound. This instrument consists of 13 indicators: wound size, depth, edges, undermining, necrotic tissue type and amount, exudate type and amount, skin color surrounding wound, peripheral tissue edema and induration, granulation tissue, and epithelialization. This instrument uses a Likert scale from 1 to 5 (1 being the healthiest and 5 the unhealthiest attribute for each characteristic). A score ranging from 1 to 12 indicates a good condition of the wound, 13 to 56 regeneration stage, and more than 60 wound degeneration (17). The reliability in the current study was 0.763.

The discomfort evaluation of wound instrument (DEWI) was used to evaluate the discomfort of patients with a DFU. The authors and colleagues developed this instrument in 2015. It consists of 11 items including the general perception of discomfort, physical discomfort (wound severity, pain, itching, fluid, odor), the physical impact of discomfort (immobility, frequency of changing dressing), the psychological impact of discomfort (frustration, anxiety due to injury), and worship disruption. In the current study, the content validity index was 0.83, and the factor loading ranged from 0.257 to 0.658.

The depression, anxiety, and stress scale (DASS) is a questionnaire that contains 21 items to measure negative emotional states: depression, anxiety, and stress. The total score was categorized as follows; normal (0-19), mild (30-59), moderate (60-89), severe (90-119), and very severe (> 120) (18). The reliability in the current study was 0.815.

Data collection procedure

Ethical approval was obtained from the ethical committee of the faculty of nursing, Universitas Indonesia, before data collection (E234020). One research assistant was mutually trained for data collection. Participants were invited to join the study during their clinical visits and while hospitalized in the studied hospitals. Written informed consent was obtained from the participants involved. The researcher personally provided a questionnaire to the respondents and filled it out according to their answers. The time needed to fill out all questions was 10 to 20 minutes. All data were collected anonymously, and no personal identifiers were recorded.

Data analysis

Descriptive statistics were used to explore the discomfort of patients with a DFU. Categorical data were represented as count and proportion, while continuous data were indicated as mean and standard deviation or as median and interquartile range. A bivariate analysis was performed before path analysis to evaluate the correlation among variables. A path analysis was carried out to examine the interaction between wound severity, discomfort, and psychological problems. The Statistical Package for Social Sciences (SPSS 22.0, IBM, Chicago, Illinois) software was used for statistical analysis.

Results

Of 140 participants included in this study, 53.6% were female and 91% were married. More than half (52.2%) were 55 and older, the mean age being 50.23 (SD : 7.82). Of the patients, 60% had an educational level above senior high school and 51.1% were government officers, with more than 60% earning less than USD 341 or 5 million Rupiahs a month. For the clinical indicators, more than half were overweight to obese, non-smokers, and having a DFU of less than four weeks (Table 1). The means were as follows: discomfort 2.35 (SD = 0.33), depression (1.34 ± 0.41), stress (1.49 ± 0.48), and anxiety (1.43 ± 0.40) (Table 2). The average score of wound severity was 31.35 ± 9.96 .

Table 1. Demographic and clinical information of patients with a DFU ($n = 140$)

Variables	N (%)
Age (year, mean \pm SD)	50.23 \pm 7.82
< 55 years	67 (47.8)
> 55 years	73 (52.2)
Gender	
Male	65 (46.4)
Female	75 (53.6)
Education level	
Not at all	7 (5)
Under senior high school	49 (35)
Above senior high school	84 (60)
Marital status	
Single	13 (9.3)
Married	127 (90.7)
Working status	
Unemployed	78 (55.7)
Government officer	52 (44.3)
Monthly income (Rupiah)	
Rp 0 - 3 million	88 (62.8)
Rp 3 - 5 million	38 (27.1)
> Rp 5 million	14 (10.1)

Variables	N (%)
Age (year, mean \pm SD)	50.23 \pm 7.82
< 55 years	67 (47.8)
> 55 years	73 (52.2)
Body mass index	
Underweight-normal	66 (47.8)
Overweight-obesity	72 (52.2)
Duration to date	
< 4 weeks	82 (59.4)
> 4 weeks	56 (41.6)
Type of wound dressing	
Conventional	65 (46.4)
Modern	75 (53.6)
Smoking status	
Yes	49 (35)
No	91 (65)

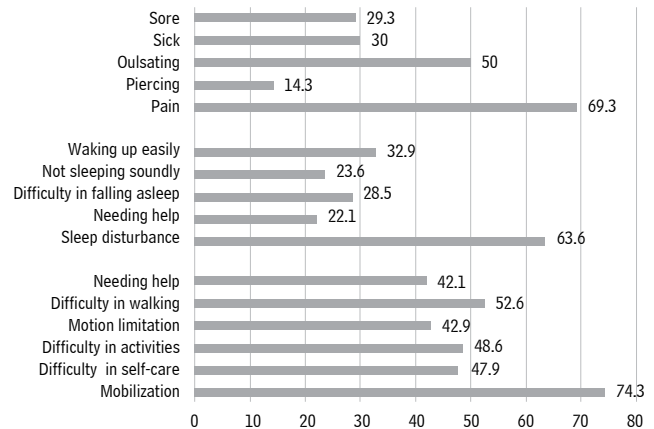
Source: Own elaboration.

Table 2. Score of discomfort, depression, stress anxiety, and wound severity among patients with a DFU ($n = 140$)

Variables	Mean	SD	95 % CI
Discomfort	2.35	0.33	2.29–2.41
Depression	1.34	0.41	1.28–1.41
Stress	1.49	0.48	1.41–1.57
Anxiety	1.43	0.40	1.37–1.50
Wound severity	31.4	9.96	29.7–33.0

Source: Own elaboration.

Figure 1 depicts the top three prevalence of discomfort experienced by patients with a DFU. Mobility problems were identified as the most frequent discomfort, followed by sleep disturbance and pain. More specifically, patients have reported difficulty in walking (52.6%), difficulty in doing daily activities (48.6%), waking up easily (32.9%), and throbbing pain (50%).

Figure 1. Top three prevalence of physical discomfort characteristics of patients with diabetic foot ulcer ($n=140$)

Source: Own elaboration.

The analysis showed a significant correlation between wound severity, discomfort, and psychological problems ($p < 0.005$). The discomfort was significantly associated with psychological problems, including stress, depression, and anxiety ($p < 0.005$). Table 3 shows that discomfort partially mediated the relationship between wound severity and psychological problems. In step 1, wound severity was significantly associated with discomfort, whose total effect was 0.41. In step 2, the impact of wound severity on psychological problems reduced but continue to be significant when the discomfort was entered in the model. The indirect effect of wound severity and psychological problems, as mediated by discomfort, was 0.11. In step 3, psychological problems were significantly associated with discomfort, whose direct effect was 0.72.

Table 3. Interaction between wound severity, DASS, and discomfort in patients with a DFU ($n = 140$)

	Coeff.	95 % CI	p-value
Wound-Discomfort	0.41	0.24–0.55	< 0.001
Wound-Discomfort-DASS	0.11	-0.05–0.26	0.05
DASS-Discomfort	0.72	0.54–0.87	< 0.001

Note: DASS=depression, anxiety, and stress scale

Source: Own elaboration.

Discussion

Most subjects in this study were at a moderate level of wound severity. This study was supported by a previous study that reported a high prevalence of moderate level of wound severity in patients with a DFU (19). A DFU is a chronic wound that occurs due to vascular disorders, neuropathy, and immunosuppression and entails a high medical cost (20, 21). DFUs could quickly develop into infections because high blood glucose becomes the right place for microorganism growth (22). Over 85% of major amputations in patients with diabetes are preceded by foot ulceration (23). A moderate level of wound severity could affect the individual's daily activity and may need some help from caregivers or family. Health care professionals need to provide an education to them regarding how to do their daily activities and increase social support to help patients with DFU. Also, preventative strategies, including annual diabetic foot screening and diabetic foot care interventions facilitated by a multidisciplinary team, should be implemented to enable early identification of diabetic patients at high risk of diabetic foot complications.

Patients with DFU experienced discomfort, specifically immobilization, sleep disturbance, and pain. The previous study reported that chronic wounds caused discomfort, including pain and difficulty in doing daily activities (24). The previous study suggested that providing physical comfort was necessary, and the main factors disrupting physical comfort were pain, noise, sleep disturbance, and immobilization (25). Although comfort may have a different meaning to different people, the previous study highlighted comfort significantly affected wound healing, reduced symptom burden, and improved daily activities and quality of life (26). However, the feeling of discomfort may be affected by cultural differences and gender issues; e.g., in Indonesia, men are expected to be strong, thus if they complain about something like discomfort, they may be considered weak. The interventions to manage a wound in patients with DFUs should enhance comfort level and consider the discomfort in male patients.

This study found that psychological problems, including anxiety and stress, were also reported by the patients with a DFU. Several studies have reported that patients with chronic wounds feel fear and anxiety about a long process of wound healing or even getting an amputation (15, 25). However, previous studies did not include stress as an independent factor. The previous study also found that stress and depression are independent risk factors for the development of diabetic ulcers and increase the risk of death in patients with diabetic ulcers despite controlling

glucose levels, diabetic ulcer severity, smoking, socioeconomic conditions, and other factors (15). Patients can feel stressed because of the pressure and situations they experience. Therefore, support from family is critical to helping patients to adjust and be more confident to take care of themselves.

The relationship between wound severity and psychological problems was mediated by discomfort. No previous study has been conducted to explore the mediating effect of discomfort on stress and psychological problems. Respondents experienced stress from moderate to severe, associated with higher degeneration of diabetic ulcers (19). There is a difference between discomfort and psychological problems. Discomfort is a direct and immediate feeling or general perception about the environment, while psychological problems are a feeling or perception that takes long to be perceived or experienced (11). According to Nurachmah et al. (26), someone who is injured will feel an imperfection, which ultimately results in emotional disturbances such as stress, anxiety, and depression. Wound care for patients with diabetic foot also needs to focus not only on the wound healing but also on the psychological problems and discomfort of patients. A comprehensive assessment of the psychological aspect should be integrated into wound care intervention.

Limitation

The limitation of this study is that the findings may not be generalized to the various patients in Indonesia because this study only collected data from three referral hospitals in Indonesia, and the country has 34 provinces distributed in more than seven big islands. Nonetheless, although selection bias in this research cannot be ruled out, our study recruited participants from two tertiary hospitals, which have similar demographic characteristics as to patients with a DFU across Indonesia.

Conclusion

In conclusion, this study indicated that patients with DFU experienced physical discomfort and psychological problems. The relationship between wound severity and psychological problems was mediated by discomfort. Future studies should explore more interaction models of discomfort in patients with DFUs using a longitudinal follow-up. Early identification of DFU severity and psychological problems should be integrated into wound care management.

Conflict of interest: None declared.

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