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ORIGINAL PAPER

Quality of life in patients with recurrent diabetic foot ulcers

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Abstract

Aim: The study aimed to evaluate the association between quality of life and wound severity in patients with recurrent diabetic foot ulcers (DFUs). *Design:* A cross-sectional study. *Methods:* The total sample comprised 86 DFU patients. The Diabetic Foot Ulcer Scale – Short Form scale was used to collect quality of life data, and Wagner grading was used to assess wound severity. Statistical analyses were conducted using the Mann-Whitney U-test and Kruskal-Wallis test. *Results:* The results showed that quality of life (QOL) in all domains was low. There were no significant differences between demographic and wound characteristics and QOL of patients. Significant differences were found between diabetes mellitus (DM) duration and Leisure / enjoying life ($p = 0.020$); Trigger and Worried about ulcers ($p = 0.002$); Trigger and Dependence / daily life ($p = 0.006$); Trigger and Negative emotions ($p = 0.006$); and Trigger and Bothered by ulcer care ($p = 0.000$). However, there were no significant differences between demographic and wound characteristics and physical health. *Conclusion:* The study showed that QOL of patients with recurrent diabetic ulcers was low. There was no correlation between quality of life or wound severity and recurrent DFUs. However, there was a correlation between DM duration and Leisure / enjoying life; Trigger and Worried about the ulcer; Trigger and Dependency / daily life; Trigger and Negative emotions; and Trigger and Bothered by ulcer care.

Keywords: DFS-SF scale, diabetic foot ulcers, quality of life, recurrent, wound severity.

Introduction

One major complication of diabetes is diabetic foot ulcers (DFUs). The prevalence of DFUs varies in some countries (Zhang et al., 2017). According to a survey in Makassar, Indonesia, the prevalence of DFUs is 12% (Yusuf et al., 2016). Another study reports prevalence of DFUs at 17–32% (Soewondo et al., 2017). DFUs affect social and economic conditions due to healing time and high cost of healing (Harries & Harding, 2015). Another study reports that DFUs have an impact on psychosocial problems (Alosaimi et al., 2019). Beside the physical problems associated with DFUs, they can also have an emotional impact and lead to loss of employment (Crocker et al., 2021). In other words, DFUs negatively affect patients' quality of life (QOL). Quality of life is an individual's perception of their position in life in the context of the culture and value systems in which they live and their goals, expectations, standards, and concerns (World Health Organization [WHO], 2012). Numerous studies have reported that DFUs negatively impact QOL (Khunkaew et al., 2019). A qualitative study has reported that DFUs contribute to the heavy burden of managing care, causing significant loss of ambulatory function, economic stress (due to medical care costs), job losses, and emotional upheaval (Crocker et al., 2021).

Treatment of DFUs is not a simple question of alleviating physical problems; it is also influenced by patients' perception and experience of problems (Alfaqih et al., 2020; Coffey et al., 2019). Understanding patients' QOL is important to achieving successful treatment of DFUs.

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In addition, when health professionals assess and understand how to treat DFUs and their complication using a patient-oriented approach, they will gain a positive understanding and perception of the patient that could help with the management of DFUs (Siersma et al., 2014).

Several studies have been conducted in Indonesia on QOL with DFUs (Sari et al., 2018; Syarif, 2013). However, none of these studies has evaluated the quality of life of recurrent DFU patients. A previous study reported that the quality of life in patients with their first experience of DFUs was low (Sari et al., 2018). A similar result was reported in a study looking at recurrent DFU patients (Dubský et al., 2013). However, there were differences in the tools used. The SF-36 (Short Form) consists of 36 items with eight aspects (Physical; Emotional; Social; Physical health; Emotional health; Pain; Fatigue; and Health).

In contrast, the Diabetic Foot Ulcer Scale – Short Form (DFS-SF) consists of 29 items with five domains as follows: Leisure (five items); Dependence / daily life (five items); Negative emotion (six items); Physical health (five items); Worry about ulcers (four items); and Bothered by ulcer care (four items). This tool showed good internal consistency, validity, reliability, and sensitivity regarding wound status (Bann et al., 2003).

Aim

This study evaluated the association between quality of life and wound severity in patients with recurrent DFUs.

Methods

Design

A cross-sectional study.

Sample

DFU patients in three wound clinics in Pontianak and Mempawah in West Kalimantan, Indonesia was the target population of the study. Purposive sampling was used as the sampling method. Between August to November 2021, patients who met the study criteria (n = 86) were recruited by nurses. The researcher administered a questionnaire to participants after they had completed an informed consent form. Inclusion criteria included: native Indonesian, older than 35 years, DFU recurrence, and without mental illness. Patients with ulcers from causes other than diabetes were excluded from the study.

Data collection

Instrument

For the study, we used the original DFS-SF, a foot ulceration-specific instrument, which was translated into Indonesian with permission from the Mapi Research Trust (Lyon, France). This instrument consisted of 29 items with six domains as follows: Leisure (five items); Dependence / daily life (five items); Negative emotion (six items); Physical health (five items); Worry about ulcers (four items); and Burden from ulcer care (four items). All items are rated on a five-point Likert scale. Domain scores are then calculated from the sum of all item scores, ranging from 0 (poorer QOL) to 100 (higher QOL) (Abetz et al., 2002). The original English-language version of the instrument has been psychometrically tested and shows good test-retest reliability and sensitivity (Abetz et al., 2002).

Wound severity assessment

The classification of Meggitt-Wagner was used to evaluate the severity of foot ulcers (Wagner, 1981). The wounds were classified as follows: Grade 1) ulcer involves epidermis and dermis layer / superficial layer; Grade 2) ulcer extends to the deep layer of the skin without abscess or osteomyelitis; Grade 3) ulcer extends to a deep layer of skin with abscess, and osteomyelitis; Grade 4) localized gangrene in a portion of toes, forefoot or heel; Grade 5) extensive gangrenous involves all the part of the foot (Wagner, 1981).

Data analysis

Data were analyzed using IBM SPSS Statistic for Windows version 26.0 (IBM Corp., Armonk, NY. USA). The characteristics of participants were analyzed and described as frequencies and percentages. Nonparametric tests such as Mann-Whitney U-test and the Kruskal-Wallis test were used after the normality of data was analyzed.

Results

The respondents' characteristics (gender, age, education, employment status, and DM duration) are shown in Table 1. As Table 1 indicates, more than half of the patients were female (54.6%), the largest age group was 47–56 years (37.2%), nearly a third had a secondary school education (30.2%), over half were employed (53.5%), and DM duration was most commonly one to ten years (69.8%).

Wound characteristics such as wound onset, trigger, wound site, and Wagner grading are shown in Table 2. The largest group of patients had grade 2 wounds (36%). The majority of wounds were less than seven

Table 1 Participants' characteristics (n = 86)

Characteristics		n (%)
Sex	female	47 (54.6)
	male	39 (45.4)
Age (years)	27–36	3 (3.5)
	37–46	15 (17.4)
	47–56	32 (37.2)
	57–66	22 (25.6)
	above 66	14 (16.3)
Education	no education	5 (5.8)
	secondary school	26 (30.2)
	junior high school	15 (17.4)
	senior high school	27 (31.4)
	bachelor	13 (15.1)
Employment status	housewife	32 (37.3)
	employed	46 (53.5)
	unemployed	4 (4.6)
	retired	4 (4.6)
Diabetes mellitus duration (years)	less than one years	2 (2.3)
	one to ten years	60 (69.8)
	more than ten years	24 (27.9)

Table 2 Wound characteristics (n = 86)

Characteristics		n (%)
Wound onset (day)	less than seven days	53 (61.6)
	seven to fourteen days	22 (25.6)
	more than fourteen days	11 (12.8)
Trigger	unknown	8 (9.3)
	trauma	32 (37.2)
	others	46 (53.5)
Wound site	toe	11 (12.8)
	dorsal	17 19.8)
	plantar	12 (13.9)
	lateral	30 (34.9)
	heel	16 (18.6)
Wagner grading	Grade 1	25 (29.1)
	Grade 2	31 (36.0)
	Grade 3	24 (27.9)
	Grade 4	5 (5.8)
	Grade 5	1 (1.2)

days in duration (61.6%). Over half the wound triggers were "other" (53.5%), and the most common wound sites were lateral (34.9%). Table 3 shows the mean (SD) scores of the six subscales of the DFS-SF. The mean scores were 35.6 (20.9) for Leisure / enjoying life; 34.1 (19.2) for Physical health; 32.2 (16.9) for Dependency / daily life; 29.0 (16.37) for Negative emotions; 26.7 (15.7) for Worry about ulcer; and 24.9 (17.5) for Bothered by ulcer care. Table 4 shows the associations between demographic data and characteristics of the wound and QOL and its domains. There were no significant differences between demographic and wound characteristics and QOL of patients. There was a significant correlation between DM duration and Leisure / enjoying life ($p = 0.020$). There was also a significant correlation between Trigger and Worry about ulcers ($p = 0.002$); Trigger and Dependence / daily life ($p = 0.006$); Trigger and Negative emotions ($p = 0.006$); and Trigger and Bothered by ulcer care ($p = 0.000$). However, there were no significant differences between demographic and wound characteristics and physical health ($p = 0.892$; $p = 0.582$; $p = 0.452$; $p = 0.661$; $p = 0.078$; $p = 0.299$; $p = 0.159$; $p = 0.156$ and $p = 0.103$, respectively).

Table 3 Domain of QOL in patients with diabetic foot ulcers (n = 86)

Domain of Quality of life	mean	SD
Leisure / enjoying life	35.60	20.97
Physical health	34.15	19.23
Dependency / daily life	32.20	16.93
Negative emotions	29.09	16.37
Worry about ulcer	26.76	15.71
Bothered by ulcer care	24.99	17.53

SD – standard deviation

Table 4 Association between demographic data and characteristics of the wound on QOL and its domains (n = 86)

Demographic and wound characteristics	Quality of life	Domains					
		Leisure / enjoying life	Physical health	Worried about ulcers	Dependence / daily life	Negative emotions	Bothered by ulcer care
Gender	0.748	0.658	0.892	0.786	0.896	0.951	0.910
Age	0.449	0,383	0.582	0.484	0.605	0.423	0.163
Education	0.490	0.725	0.452	0.794	0.826	0.809	0.596
Employment	0.529	0.253	0.661	0.444	0.520	0.908	0.056
DM duration	0.662	0.020*	0.078	0.264	0.057	0.108	0.844
Wound onset	0.302	0.519	0.299	0.086	0.138	0.058	0.078
Trigger	0.678	0.244	0.159	0.002**	0.006**	0.006**	0.000**
Wound site	0.238	0.207	0.156	0.074	0.118	0.057	0.071
Wagner grade	0.125	0.083	0.103	0.144	0.104	0.072	0.395

*DM – diabetes mellitus; SD – standard deviation; *p < 0.05; **p < 0.01**; Mann-Whitney U-test and Kruskal-Wallis test*

Discussion

In the present study, diabetic patients with recurrent foot ulcers had low DFS-SF scores, which conforms with a previous study (Alrub et al., 2019). QOL of people with DFUs was significantly affected in all aspects (social, physical, phycological, and economical) (Gilpin & Lagan, 2008). In a systematic review and meta-analysis, people with DFUs were found to have significantly lower QOL (Khunkaew et al., 2019).

Our data showed a correlation between DM duration and the domain of Leisure / enjoying life. This result is similar to that in other studies in which DM duration correlated with Health Related Quality of Life (HRQOL) (Komaratat et al., 2021; Sparring et al., 2013). Patients suffering from DM will be at risk of complications. A previous study reported that when compared to patients with diabetes who had no complications and those with one complication, patients with two or more complications had a significantly higher risk of lower HRQOL scores in the following sub-domains: Physical functioning, Physical health, Role emotional, Energy, Emotional, Social, Pain, General health, and Health change (Alshayban & Joseph, 2020). In addition, previous studies have reported that Activities of daily living, Physical health, Social and Family life, and Leisure activities would be affected by the presence of DFUs (Gilpin & Lagan, 2008; Registered Nurses' Association of Ontario [RNAO], 2013). These results are similar to those from a previous study in Indonesia (Sari et al., 2018). Therefore, the correlation between DM duration and the domain of Leisure / enjoying indicates a negative impact on QOL.

Our study showed a correlation between Trigger and: Worry about the ulcer, Dependence / daily life, Negative emotions, and Bothered by ulcer care. In contrast to a previous study in Indonesia, there was a correlation between the Worried about ulcers domain and factors such as income, grade of the wound, number of wounds, and blood glucose (Sari et al., 2018). Physical wellbeing relates to an individual's ability to partake in normal activities of daily living, such as self-hygiene and dressing and feeding oneself (Mclntosh et al., 2019). Physical symptoms are interlinked with the psychological impact of living with a chronic wound, particularly DFUs (Upton & South, 2011). In addition, another study reported that negative emotions affected psychological wellbeing (Guo & DiPietro, 2010). This result shows a correlation between the physical and psychological aspects of QOL.

The present study has some limitations. First, the sample size was relatively small. Second, in this study, the researcher did not pay attention to co-morbid conditions that may affect QOL. Finally, some variation in QOL between regions in Indonesia might be caused by differences in culture. In the future, a larger sample size is needed, representative of Indonesia as a whole. On the other hand,

in the present study, we used QOL questionnaires specific to foot ulcers in each domain; thereby eliminating responses from causes other than foot ulcers. A strength of this study is that it is the first to evaluate QOL in diabetic foot ulcers in Indonesia using the DFS-SF. The DFS-SF scale was specially designed to evaluate QOL with DFUs.

Conclusion

The study showed that the QOL of patients with recurrent diabetic ulcers was low. There was no correlation between quality of life and wound severity of recurrent DFU patients. There was, however, a correlation between DM duration and Leisure / enjoying life. In addition, there was a correlation between Trigger and: Worried about the ulcer; Dependency / daily life; Negative emotions; and Bothered by ulcer care. In the clinical setting, this study provides an evidence base for preventive care to improve the QOL of patients with recurrence of DFUs. In the planning of preventive care, it is necessary to consider factors such as DM duration and Trigger of DFUs.

Ethical aspects and conflict of interest

All authors in this study declare there are no competing interests. The institutional review board approved this study of STIK Muhammadiyah Pontianak (number: 223/II.1.AU/KET.ETIK/VIII/2021). The Declaration of Helsinki principle was followed in this study.

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Author contributions

Conception and design (HHy, LM), data analysis and interpretation (HHy, YS, JJ), manuscript draft (YS, HHt, LE), critical revision of the manuscript (DDA, HHt, MRR), final approval of the manuscript (HHy, SA).

References

Abetz, L., Sutton, M., Brady, L., McNulty, P., & Gagnon, D. D. (2002). The Diabetic Foot Ulcer Scale (DFS): a quality of life instrument for use in clinical trials. *Practical Diabetes International*, *19*(6), 167–175. https://doi.org/10.1002/pdi.356

Alfaqih, M. R., Kusnanto, K., & Padoli, P. (2020). Systematic review a systematic review : the experience of patient with diabetic foot ulcers. *Jurnal Ners*, *15*(2), 120–128.

Alosaimi, F. D., Labani, R., Almasoud, N., Alhelali, N., Althawadi, L., & Aljahani, D. M. (2019). Associations of foot ulceration with quality of life and psychosocial determinants among patients with diabetes; a case-control study. *Journal of Foot and Ankle Research*, *12*(1), 57. https://doi.org/10.1186/s13047-019-0367-5

Alrub, A. A., Hyassat, D., Khader, Y. S., Bani-Mustafa, R., Younes, N., & Ajlouni, K. (2019). Factors associated with health-related quality of life among Jordanian patients with diabetic foot ulcer. *Journal of Diabetes Research*, *2019*, Article ID 4706720. https://doi.org/10.1155/2019/4706720

Alshayban, D., & Joseph, R. (2020). Health-related quality of life among patients with type 2 diabetes mellitus in Eastern Province, Saudi Arabia: a cross-sectional study. *PLoS ONE*, *15*(1), e0227573. https://doi.org/10.1371/journal.pone.0227573

Bann, C. M., Fehnel, S. E., & Gagnon, D. D. (2003). Development and validation of the Diabetic Foot Ulcer Scale-short form (DFS–SF). *Pharmaeconomics*, *21*(17), 1277–1290. https://doi.org/10.2165/00019053-200321170-00004

Coffey, L., Mahon, C., & Gallagher, P. (2019). Perceptions and experiences of diabetic foot ulceration and foot care in people with diabetes: a qualitative meta-synthesis. *International Wound Journal*, *16*(1), 183–210. https://doi.org/10.1111/iwj.13010

Crocker, R. M., Palmer, K. N. B., Marrero, D. G., & Tan, T-W. (2021). Patient perspectives on the physical, psycho-social, and financial impacts of diabetic foot ulceration and amputation. *Journal of Diabetes and Its Complications*, *35*(8), 107960. https://doi.org/10.1016/j.jdiacomp.2021.107960

Dubský, M., Jirkovská, A., Bem, R., Fejfarová, V., Skibová, J., Schaper, N. C., & Lipsky, B. A. (2013). Risk factors for recurrence of diabetic foot ulcers: prospective follow-up analysis in the Eurodiale subgroup. *International Wound Journal*, *10*(5), 555–561. https://doi.org/10.1111/j.1742-481X.2012.01022.x

Gilpin, H., & Lagan, K. (2008). Quality of life aspects associated with diabetic foot ulcers: a review. *The Diabetic Foot Journal*, *11*(2), 56–62.

Guo, S., & DiPietro, L. A. (2010). Factors affecting wound healing. *Journal of Dental Research*, *89*(3), 219–229. https://doi.org/10.1177/0022034509359125

Harries, R. L., & Harding, K. G. (2015). Management of diabetic foot ulcers. *Current Geriatrics Reports*, *4*(3), 265–276. https://doi.org/10.1007/s13670-015-0133-x

Khunkaew, S., Fernandez, R., & Sim, J. (2019). Health-related quality of life among adults living with diabetic foot ulcers: a meta-analysis. *Quality of Life Research*, *28*(6), 1413–1427. https://doi.org/10.1007/s11136-018-2082-2

Komaratat, C., Auemaneekul, N., & Kittipichai, W. (2021). Quality of life for type II diabetes mellitus patients in a suburban tertiary hospital in Thailand. *Journal of Health Research*, *35*(1), 3–14. https://doi.org/10.1108/JHR-05-2019-0100

Mclntosh, C., Ivory, J. D., Gethin, G., & MacGilchrist, C. (2019). Optimising wellbeing in patients with diabetic foot ulcers. *Journal of The European Wound Management Association*, *20*(1), 23–28. https://doi.org/10.35279/jewma201905.02

Registered Nurses' Association of Ontario. (2013). *Assessment and management of foot ulcers for people with diabetes* (2nd ed.). Registered Nurses' Association of Ontario. https://rnao.ca/sites/rnao-ca/files/Assessment_and_Management_of_Foot_Ulcers_for_People_with_Diabetes_Second_Edition1.pdf

Sari, Y., Purnawan, I., Taufik, A., & Sumeru, A. (2018). Quality of life and associated factors in Indonesian diabetic patients with foot ulcers. *Nurse Media Journal of Nursing*, *8*(1), 13–24. https://doi.org/10.14710/nmjn.v8i1.16815

Siersma, V., Thorsen, H., Holstein, P. E., Kars, M., Apelqvist, J., Jude, E. B., Piaggesi, A., Bakker, K., Edmonds, M., Jirkovská, A., Mauricio, D., Ragnarson Tennvall, G., Reike, H., Spraul, M., Uccioli, L., Urbancic, V., van Acker, K., van Baal, J., & Schaper, N. C. (2014). Health-related quality of life predicts major amputation and death, but not healing, in people with diabetes presenting with foot ulcers : The Eurodiale study. *Diabetes Care*, *37*(3), 694–700. https://doi.org/10.2337/dc13-1212

Soewondo, P., Suyono, S., Sastrosuwignyo, M. K., Harahap, A. R., Sutrisna, B., & Makmun, L. H. (2017). Prediction of wound healing in diabetic foot ulcers: an observational study in tertiary hospital in Indonesia. *Acta Medica Indonesiana*, *49*(1), 41–51.

Sparring, V., Nystrom, L., Wahlstrom, R., Jonsson, P. M., Ostman, J., & Burstrom, K. (2013). Diabetes duration and health-related quality of life in individuals with onset of diabetes in the age group 15–34 years – a Swedish population – based study using EQ-5D. *BMC Public Health*, *13*(377), 2–11. https://doi.org/10.1186/1471-2458-13-377

Syarif, H. (2013). Kualitas Hidup Pasien Ulkus Diabetik Di Poliklinik Endokrin Rsudza, Banda Aceh [Quality of life diabetic ulcers patients in the endocrine polyclinic of Rsudza, Banda Aceh]. *Idea Nursing Journal*, *4*(1), 1–7.

Upton, D., & South, F. (2011). The psychological consequences of wounds – a vicious circle that should not be overlooked. *Wounds UK*, *7*(4), 136–138.

Wagner, F. W. (1981). The Dysvascular foot: a system for diagnosis and treatment. *Foot & Ankle International*, *2*(2), 64–122. https://doi.org/10.1177/107110078100200202

World Health Organization. (2012). *Programme on mental health; WHOQOL user manual; WHO/HIS Rev.2012.03*. https://www.who.int/publications/i/item/WHO-HIS-HSI-Rev.2012-3

Yusuf, S., Okuwa, M., Irwan, M., Rassa, S., Laitung, B., Thalib, A., Kasim, S., Sanada, H., Nakatani, T., & Sugama, J. (2016). Prevalence and risk factor of diabetic foot ulcers in a regional hospital, Eastern Indonesia. *Open Journal of Nursing*, *6*(1), 1–10. https://doi.org/10.4236/ojn.2016.61001

Zhang, P., Lu, J., Jing, Y., Tang, S., Zhu, D., & Bi, Y. (2017). Global epidemiology of diabetic foot ulceration: a systematic review and meta-analysis. *Annals of Medicine*, *49*(2), 106–116. https://doi.org/10.1080/07853890.2016.1231932

