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RETRACTION: Factors Influencing the Severity of Diabetic Foot Ulcer in The Hospital: A Scoping Review

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RETRACTION: Fakhrun Nisa, Sudirman, and Muhammad Saleh Sumalia. *Factors Influencing the Severity of Diabetic Foot Ulcer in the Hospital: A Scoping Review. Indonesian Journal of Nursing & Health Care*, Vol. 2(1), 2025, pp. 32–36. https://doi.org/10.1234/4s0sjf57

The above article, published online on 1 February 2025 in the *Indonesian Journal of Nursing & Health Care*, has been **retracted** by agreement between the Editor-in-Chief and the Editorial Board.

This retraction follows a formal complaint submitted by **Ms. Yunita** (Master's in Nursing Program, Universitas Hasanuddin Makassar), who reported that substantial content in the article originated from her personal academic document, which she had shared privately via WhatsApp on 4 September 2024 for educational purposes only. The material was subsequently submitted and published without her permission or proper attribution.

An internal editorial investigation concluded that this case constitutes a **breach of authorship ethics**, as the submitted manuscript incorporated significant portions of Ms. Yunita's original work without acknowledgment. Furthermore, **the listed authors were unable to provide satisfactory evidence** of original authorship or intellectual ownership of the contested material during the clarification process.

In accordance with the principles of transparency, publication ethics, and integrity guided by the **Committee on Publication Ethics (COPE)** the editorial board has made the decision to formally retract the article.

This notice serves to preserve the integrity of the scholarly record and to uphold ethical standards in academic publishing.

RETRACTED

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RETRACTED:Factor Influencing The Severity of Diabetic Foot Ulcer in The Hospital: A Scoping Review

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ABSTRACT
Background: Wrongone of the most common, costly, severe and serious complications of diabetes and a leading cause of hospitalization worldwideis Diabetic Foot Ulcer (DFU). DFU mis a result of peripheral neuropathy and vascular disorders.DFU results in impaired physical and psychosocial functioning and risk of amputation. It also results in significant morbidity and mortality. These DFU complications have a significant economic impact on patients and the health system.
Objective: To examine and map the factors that influence the severity of DFU in hospitals.
Methods: In this case, the review focused on factors that influence the severity of DFU in hospitals. Literature search using electronic databases such as (PubMed, Wiley, ProQuest, Science Direct, and ebscohost).
Results: From the review results of five articles obtained in this study showed that there are nine factors that affect the severity of DFU. Recurring factors from various studies, namely age, ulcer duration, poor glycemic control and peripheral neuropathy are factors in the severity of DFU.
Conclusion: This study concludes that the importance of knowing the factors that influence the severity of DFU can help nurses develop comprehensive nursing care plans, improve quality of life and reduce DFU complications.
Keywords: Diabetic Foot Ulcer, Severity Factors, Hospitalized Patients, Risk Factors, Wound Assessment

INTRODUCTION

Diabetes mellitus is a disease whose prevalence continues to grow globally. In 2013, it was estimated to increase beyond 592 million by 2035, with a global prevalence of 10.1%. (International Diabetes Federation, 2022).Wrongone of the most common, costly, severe and serious complications of diabetes and a leading cause of hospitalization worldwideis Diabetic Foot Ulcer (DFU)(Theocharidis et al., 2022). DFU mis a result of peripheral neuropathy and vascular disorders (Pitocco et al., 2019).DFU results in impaired physical and psychosocial function and the risk of amputation.(Coffey, Mahon, & Gallagher, 2019). This also results in significant morbidity and mortality.(Everett & Mathioudakis, 2018). These DFU complications have a major economic impact on patients and the healthcare system.

International Diabetes Federation(IDF) estimates that 40 to 60 million people with diabetes suffer from DFU globally.(International Diabetes Federation, 2022). In Africa it is around 7.2% and in Ethiopia estimates have varied from 11.6% to 31.1%.(Negash et al., 2022). In Indonesiaespecially in the eastern part it reached 12% with a DFU risk factor of around 55.4%(Yusuf et al., 2016).Besides that,The recurrence rate of DFU remains high at 40% at one year, 65% at three and five years after DFU healing.(Reardon et al., 2020).The mortality rate of DFU also increases, estimated at 5% within 12 months and the mortality rate within 5 years is estimated at 42%.(Ghobadi, Sarbarzeh, Jalilian, Abdi, & Manouchehri, 2020).

Several previous studies have reported that DFU occurs due to lack of Hb1AC control, foot trauma, mechanical pressure, smoking history, duration of diabetes 10–15(Zhang et al., 2017)and obesity(Hussain et al., 2022). Other studies have found that factors such as peripheral neuropathy(Hussain et al., 2022), peripheral artery disease,vasculopathy, ischemia and known causative factors(Vergès et al., 2021). While it is important to know the factors that cause DFU, it is also important to know the factors that influence the severity of DFU. Higher severity of DFU results in lower healing rates and higher amputations in DFU patients.(Menezes, G. M., & Vani K., 2019). Therefore, this scoping review was conducted to identify, map and summarize the types of evidence available, and to provide information for future research on factors influencing DFU severity.

METHODS

This review uses the scoping review method. The review method or framework in the scoping review uses the Arksey & O'Malle Framework(Arksey & O'Malley, 2005), which consists of 5 steps to explain and facilitate each stage of the framework. The review method or framework is as shown below.

a. Step 1: Identifying Research Questions

The research question raised by the scoping review was: What are the factors that influence the severity of diabetic foot ulcers in hospitals?

b. Step 2: Identifying Relevant Studies And Search Terms

After identifying the scoping review question. The review follows a search strategy guided by JBI(JBI, 2017)to explore factors that influence severity in diabetic foot ulcer population. The next step is to identify relevant

articles. This is done by determining the keywords and phrases used in the search. We used 5 databases used in this scoping review, namely Pubmed, Willey, ProQuest, Science Direct and Garuda. The initial search took the title, abstract, and content to identify keyword terms. The use of keywords for the databases can be seen in **Table 1.**

Table 1. Keywords For Database

No	Database	Keywords	Articles	Access Date
1	Pubmed	(((Diabetic Foot Ulcer) OR (DFU)) AND (Factors Severity)) AND (Hospitals)	373	September 16, 2024
2	Wiley	(((Diabetic Foot Ulcer) OR (DFU)) AND (Factors Severity)) AND (Hospitals)	396	September 16, 2024
3.	Proquest	(((Diabetic Foot Ulcer) OR (DFU)) AND (Factors Severity)) AND (Hospitals)	820	September 16, 2024
4.	Science Direct	(((Diabetic Foot Ulcer) OR (DFU)) AND (Factors Severity)) AND (Hospitals)	455	September 16, 2024
5.	Ebscohost	factors of severity of diabetic foot ulcers	10	September 16, 2024

The inclusion and exclusion criteria for this scoping review were based on the Population Concepts Context (PCC) model and eligible studies were screened for in Table 2. In addition, articles were retrieved within the last 5 years, full text, both qualitative and quantitative primary studies. Reviews, interventions, study protocol papers were not included.

Tabel 2. Population Concepts Context (PCC)

Criteria	Inclusion
Population	Diabetic foot ulcer
Draft	Severity factors
Context	Done in hospital

c. Stage 3: Study selection

Figure 1 illustrates the process, results of article screening using PRISMA flowchart, and manuscript extraction criteria after the initial search was completed based on the study inclusion and exclusion criteria. In summary, from 5 databases, 1988 relevant abstracts were collected. After duplication of articles, 1332 articles remained. The next step, articles were screened based on title/abstract resulting in 128 articles for further screening. After that, articles were screened based on eligible full text resulting in 5 articles in accordance with the research question.

d. Search Validation and Data Selection

All abstracts of relevant articles found using the search terms, and those available in the indicated databases during the review period were included. All articles were downloaded to the Mendeley software reference manager and exported to the Rayyan software program.(Ouzzani, Hammady, Fedorowicz, & Elmagarmid, 2016). Furthermore, articles that did not meet the inclusion criteria as mentioned above were then discarded. The authors reviewed all titles and abstracts for irrelevant studies. Retained articles were obtained in full text and independently reviewed.

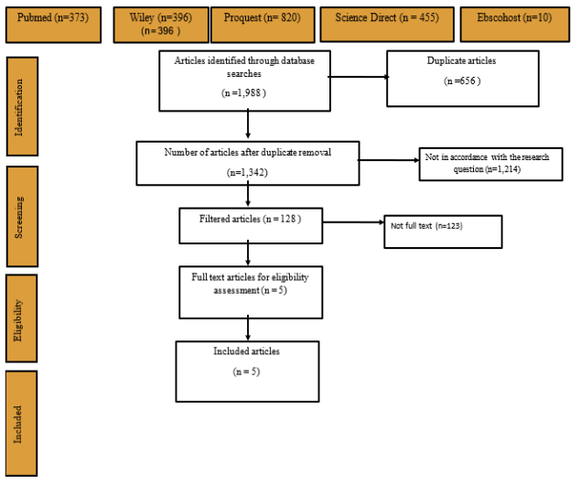

Figure 1. Flowchart Inclusion & Exclusion

e. Step 4: Mapping the data

Data extraction was performed independently in the form of tables from the included items. The studies were then screened to report important information including authors, title, objectives, samples, results and factors influencing the severity of Diabetic Foot Ulcer. The measured variables are listed in Table 3.

f. Stage 5: Compiling, summarizing, and reporting results

The results of this review are reported through descriptive analysis and narrative summary of findings using text and tabulations.

g. Stage 6: Consultation

Researchers consulted with supervisors to gain insights from multiple perspectives by identifying factors influencing DFU severity.

RESULT

a. Study Characteristics

Detailed characteristics of each eligible study are presented in the Supporting Information. Included studies were published in the last 5 years. Of the 5 included studies, 3 were cross-sectional studies.(Rubio, Jiménez, & Lázaro-Martínez, 2020),(Ghobadi et al., 2020),(Yunir et al., 2021). One cohort study (Smith-Strøm et al.,

2017), a qualitative study(Madmoli et al., 2019)published from 2017-2021. Sample sizes varied from 105 participants to 4436 participants in the study.

b. DFU severity factors

Of the 5 studies identified factors that severity of DFU. One study identified the severity of DFU influenced by age, duration of illness, and patient awareness. And the four studies that affect the severity of DFU are location, perfusion, neuropathy, depth, leukocytes, poor glycemic control.

Table 3. Studies examining factors of severity of diabetic foot ulcers

No	Author, Year	Title	Objective	Sample(N, M age, range)	Results	Severity Factors of Diabetic Foot Ulcer
1.	(Ghobadi et al., 2020)	Evaluation of Factors Affecting the Severity of Diabetic Foot Ulcer in Patients with Diabetes Referred to a Diabetes Center in Kermanshah	To investigate factors influencing the severity of DFU in diabetic patients.	190 diabetic patients with a diagnosis of DFU, the age of the patients studied was over 18 years.	There were 109 women (57.4%). Twenty-six patients had other diabetic complications and DFU. The average awareness score in patients was 6.99±2.76 and function 62.22±9.92. The results of the study found a direct relationship between age and duration of illness with patient awareness scores (P=0.008,P=0.000). There was also a direct relationship between education level with awareness scores and self-care function scores (P=0.000,P=0.000),However, statistical results did not find any relationship between awareness and function in patient self-care with the severity of DFU. (P>0.05).	Age, and duration of illness
2.	(Yunir et al., 2021)	Nonvascular contributing factors of diabetic foot ulcer severity in national referral hospital of Indonesia-	To investigate the characteristics of patients with DFU without peripheral artery disease (PAD) and analyze non-vascular factors associated with DFU severity in a national referral hospital in tertiary care in Indonesia.	123 DFU patients	DFU patients were mostly over 50 years old (75.6%) and diagnosed with T2DM for 5 years with poor glycemic control (82.7%) and peripheral neuropathy (91.3%). Multivariate analysis showed that leukocytes (p=0.03) and platelets (p=0.023) were significantly correlated with the severity of DFU.	Poor glycemic control, peripheral neuropathy, duration of diabetes, leukocytes, and platelets
3.	(Madmoli et al., 2019)	Some influential factors on severity of diabetic foot ulcers and Predisposing of limb amputation: A 7-year study on diabetic patients	To determine the factors that influence the severity of diabetic foot ulcers and predisposition to limb amputation.	4436 DFU patients with a mean age of 54.36 ± 42.68 years	This study involved 4436 diabetic patients. 421 patients (9.4%) had a history of diabetic foot ulcers. Also, 385 patients (8.6%) had a history of leg amputation. In this study, 596 patients (13.4%) had a history of smoking and the relationship between smoking and drug use with ulcer severity was significant (p = 0.006). Of the 338 patients, in this study the relationship between blood glucose levels with the severity of foot ulcers and leg amputations was significant (p <0.05), this means that people who have higher blood sugar levels, more severe foot ulcers and more amputations	Age, smoking, and higher blood sugar levels are associated with more severe leg ulcers and a higher risk of amputation.
4	(Rubio et al., 2020)	Mortality in Patients with Diabetic Foot Ulcers: Causes, Risk Factors, and Their Association	To analyze causes of death, as well as relevant clinical factors associated with survival.	338 DFU patients	Cox regression analysis adjusted for multivariate models showed the following associations with mortality, with hazard ratios (HRs) (95% CI): age, 1.07 (1.05–1.08); HbA1c value <7% (53	The severity of DFU is influenced by neuropathy, infection and wound depth.

		with Evolution and Severity of Ulcers			mmol/mol), 1.43 (1.02–2.0); active smoking, 1.59 (1.02–2.47); ischemic heart or cerebrovascular disease, 1.55 (1.15–2.11); chronic kidney disease, 1.86 (1.37–2.53); and ulcer severity (SINBAD system) 1.12 (1.02–1.26).	
5	(Smith-Strøm et al., 2017)	Severity and duration of diabetic foot ulcer (DFU) before seeking care as predictors of healing time: A retrospective cohort study	To investigate whether the duration of ulcers before starting treatment in specialist health care, and the severity of ulcers	105 patients	The association was significant (P = 0.042) with a higher proportion having a short duration from ulcer onset to referral among those with less severe ulcers (50%), compared with more severe ulcers (34.9%). Fifty percent of patients with low ulcer severity had an ulcer duration of 0-13 days before referral to specialist care, while only 16% of patients with high severity had an ulcer duration of 0-13 days before referral. In the high severity group, 34.9% of patients had waited 52 days or more before referral.	Ulcer duration and ulcer severity still showed a significant relationship with healing time.

DISCUSSION

The main objective of this review was to examine and map the factors that influence the severity of DFU in the hospital. The results of the scoping review in this study showed that there were nine factors that influenced the severity of DFU. Recurrent factors from various studies, namely age, ulcer duration, poor glycemic control, and peripheral neuropathy are factors of DFU severity.

a. Age

Various studies also report that the average age of DFU patients is between 40-55 years. In Indonesia, DFU occurs more often in patients over 50 years of age who have been diagnosed with DMT2 for 5 years and have poor glycemic control and peripheral neuropathy.(Yunir et al., 2021).

b. Ulcer Duration

Patients who had an ulcer duration of 60 days (2 months) before the start of treatment had a lower healing rate. The duration of the ulcer reported by Smith-Strøm et al, that patients referred to health care had a higher severity related to wound healing time(Smith-Strøm et al., 2017).

c. Glycemic control

In this review, we found that the relationship between glucose levels and DFU severity was significant, meaning that people with higher blood sugar levels had more severe foot ulcers and more amputations.(Madmoli et al., 2019)to high mortality rates(Rubio et al., 2020). Research by Edakkepuram et al reported that poor glycemic status is also a risk factor for ulcer occurrence, impairing healing.(Edakkepuram, P. C., & Gopi, 2017), which has an impact on increasing the death rate(Mader et al., 2019).

d. Peripheral neuropathy

Neuropathy is an identified risk factor for DFU severity. Diabetic neuropathy increases vascular dysfunction due to peripheral nerve damage.(Yunir et al., 2021).The results of this study can be linked to research conducted in Iran, rrisk factors for the development of DFU include distal neuropathy(Yazdanpanah et al., 2018).Diabetic neuropathyalso resulted infoot deformity, which causes increased skin pressure when walking, leading to a high risk of DFU.(Bandyk, 2018).

These complications can occur in DFU patients and affect them, but it is not known for certain which complications have a greater influence on the severity of DFU.

CONCLUSION

DFU is a severe complication of diabetes. Seven factors were reported in 5 studies that affect the severity of DFU. The most recurring factors were age, duration, poor glycemic control, peripheral neuropathy. In addition, diabetes has many other factors associated with DFU. So knowing the factors that affect the severity of DFU can help nurses develop a comprehensive nursing care plan, improve quality of life and reduce DFU complications. It is expected that further studies should be conducted for additional information about it.

REFERENCES

Arksey, H., & O'Malley, L. (2005). Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology*, *8*(1), 19–32. https://doi.org/10.1080/1364557032000119616

Bandyk, D. F. (2018). The diabetic foot: Pathophysiology, evaluation, and treatment. *Seminars in Vascular Surgery*, *31*(2–4), 43–48. https://doi.org/10.1053/j.semvascsurg.2019.02.001

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

Edakkepuram, U., P. C., S., & Gopi, E. V. (2017). A prospective cohort study of hypoalbuminemia as risk factor of wound healing in diabetic foot: a study from tertiary hospital in south India. *International Surgery Journal*, *4*(9), 3141. https://doi.org/10.18203/2349-2902.isj20173903

Everett, E., & Mathioudakis, N. (2018). Update on management of diabetic foot ulcers. *Annals of the New York Academy of Sciences*, *1411*(1), 153–165. https://doi.org/10.1111/nyas.13569

Ghobadi, A., Sarbarzeh, P. A., Jalilian, M., Abdi, A., & Manouchehri, S. (2020). Evaluation of factors affecting the severity of diabetic foot ulcer in patients with diabetes referred to a diabetes centre in Kermanshah. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, *13*, 693–703. https://doi.org/10.2147/DMSO.S242431

Hussain, F., Shabbir, M., Bunyad, S., Arshad, F., Kashif, M., & Siddique, J. (2022). Diabetic Foot Ulcers: Prevalence and Associated Risk Factors Among Diabetic Patients. *Pakistan Journal of Health Sciences*, 86–90. https://doi.org/10.54393/pjhs.v3i05.241

Internasioanl Diabetes Federation. (2022). IDF Diabetes Atlas, 9th.

JBI. (n.d.). The Joanna Briggs Institute Joanna Briggs Institute Reviewers' Man_ual 2017.

Mader, J. K., Haas, W., Aberer, F., Boulgaropoulos, B., Baumann, P., Pandis, M., … Sourij, H. (2019). Patients with healed diabetic foot ulcer represent a cohort at highest risk for future fatal events. *Scientific Reports*, *9*(1), 1–6. https://doi.org/10.1038/s41598-019-46961-8

Madmoli, M., Madmoli, Y., Taqvaeinasab, H., Khodadadi, M., Darabiyan, P., & Rafi, A. (2019). Some influential factors on severity of diabetic foot ulcers and Predisposing of limb amputation: A 7-year study on diabetic patients. *International Journal of Ayurvedic Medicine*, *10*(1), 75–81. https://doi.org/10.47552/ijam.v10i1.1222

Madmoli, M., Madmoli, Y., Taqwaeinasab, H., Khodadadi, M., Darabiyan, P., Rafi, A., … Rafi, A. (2012). Some influential factors on severity of diabetic foot ulcers and Predisposing of limb amputation: A 7-year study on diabetic patients, (11), 75–81.

Menezes, J. V. F., G. M., S., & Vani K., S. (2019). Clinical utility of diabetic ulcer severity score in surgical practice. *International Surgery Journal*, *6*(7), 2469. https://doi.org/10.18203/2349-2902.isj20192976

Negash, W., Assefa, T., Sahiledengle, B., Tahir, A., Regassa, Z., Feleke, Z., … Wilfong, T. (2022). Prevalences of diabetic foot ulcer and foot self-care practice, and associated factors in adult patients with diabetes in south-east Ethiopia. *The Journal of International Medical Research*, *50*(10). https://doi.org/10.1177/03000605221129028

Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan-a web and mobile app for systematic reviews. *Systematic Reviews*, *5*(1), 1–10. https://doi.org/10.1186/s13643-016-0384-4

Pitocco, D., Spanu, T., Di Leo, M., Vitiello, R., Rizzi, A., Tartaglione, L., … Sanguinetti, M. (2019). Diabetic foot infections: A comprehensive overview. *European Review for Medical and Pharmacological Sciences*, *23*(2), 26–37. https://doi.org/10.26355/EURREV_201904_17471

Reardon, R., Simring, D., Kim, B., Mortensen, J., Williams, D., & Leslie, A. (2020). Diabetic Foot Ulcer, *49*(5), 250–255.

Rubio, J. A., Jiménez, S., & Lázaro-Martínez, J. L. (2020). Mortality in patients with diabetic foot ulcers: Causes, risk factors, and their association with evolution and severity of ulcer. *Journal of Clinical Medicine*, *9*(9), 1–14. https://doi.org/10.3390/jcm9093009

Smith-Strøm, H., Iversen, M. M., Igland, J., Østbye, T., Graue, M., Skeie, S., … Rokne, B. (2017). Severity and duration of diabetic foot ulcer (DFU) before seeking care as predictors of healing time: a retrospective cohort study. *PloS One*, *12*(5), e0177176.

Theocharidis, G., Thomas, B. E., Sarkar, D., Mumme, H. L., Pilcher, W. J. R., Dwivedi, B., … Bhasin, M. (2022). Single cell transcriptomic landscape of diabetic foot ulcers. *Nature Communications*, *13*(1). https://doi.org/10.1038/s41467-021-27801-8

Vergès, B., Brands, R., Fourmont, C., Petit, J. M., Simoneau, I., Rouland, A., … Chauvet-Gélinier, J. C. (2021). Fewer Type A personality traits in type 2 diabetes patients with diabetic foot ulcer. *Diabetes and Metabolism*, *47*(6). https://doi.org/10.1016/j.diabet.2021.101245

Yazdanpanah, L., Shahbazian, H., Nazari, I., Arti, H. R., Ahmadi, F., Mohammadianinejad, S. E., … Hesam, S. (2018). Incidence and risk factors of diabetic foot ulcer: A population-based diabetic foot cohort (ADFC study)-two-year follow-up study. *International Journal of Endocrinology*, *2018*. https://doi.org/10.1155/2018/7631659

Yunir, E., Tahapary, D. L., Tarigan, T. J. E., Harbuwono, D. S., Oktavianda, Y. D., Kristanti, M., … Soewondo, P. (2021). Non-vascular contributing factors of diabetic foot ulcer severity in national referral hospital of Indonesia. *Journal of Diabetes and Metabolic Disorders*, *20*(1), 805–813. https://doi.org/10.1007/s40200-021-00827-x

Yusuf, S., Okuwa, M., Irwan, M., Rassa, S., Laitung, B., Thalib, A., … Sugama, J. (2016). Prevalence and Risk Factor of Diabetic Foot Ulcers in a Regional Hospital, Eastern Indonesia. *Open Journal of Nursing*, *06*(01), 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/10.1080/07853890.2016.123193