The Relationship Between Lifestyle and the Severity of Diabetic Peripheral Neuropathy at Sapta Medika Indrapura Hospital

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Abstract

Diabetes mellitus (DM) is a chronic metabolic disorder whose prevalence continues to increase globally. One of its most detrimental microvascular complications is diabetic peripheral neuropathy (DPN), which is strongly influenced by the patient's lifestyle. This study aimed to analyze the relationship between lifestyle and the severity of DPN in patients with DM at Sapta Medika Indrapura Hospital. This was a quantitative, descriptive-analytical study with a cross-sectional design. A total of 51 patients with DM were selected through purposive sampling. Lifestyle was measured using the FANTASTIC Lifestyle Checklist (covering family/friends, physical activity, nutrition, smoking, alcohol, sleep/stress, and behavioral patterns), and the severity of DPN was assessed using the Diabetic Neuropathy Score (DNS). Data were analyzed using Spearman's rho correlation test. Most respondents had an unhealthy lifestyle (68.6%) and experienced severe DPN (64.7%). The Spearman's rho test showed a significant but weak positive correlation between lifestyle and DPN severity ($r = 0.116$; $p = 0.042$; $p < 0.05$). Lifestyle is significantly associated with the severity of DPN in patients with diabetes, although the association is weak. Healthy behavioral change remains an important strategy to reduce the risk of further complications such as ulceration and amputation. The small, single-center sample limits generalizability, and the cross-sectional design precludes causal inference.

Keywords: Diabetes Mellitus, Lifestyle, Diabetic Peripheral Neuropathy, Disease Severity, Indonesia.

INTRODUCTION

Diabetes Mellitus (DM) is a long-term metabolic disorder that progressively worsens, characterized by persistent hyperglycemia resulting from inadequate insulin production, ineffective insulin action, or a combination of both (Sutomo & Purwanto, 2023; Yameny, 2024). The global burden of DM continues to rise, now affecting 589 million people with a prevalence of 11.1%. Indonesia ranks fifth in the world with 20.4 million people living with diabetes and a prevalence of 11.3%, while the high proportion of undiagnosed cases (73.2%) constitutes a crucial risk factor for the rising incidence of chronic complications (IDF, 2025).

This increasing prevalence is directly proportional to a higher incidence of chronic microvascular complications, of which diabetic peripheral neuropathy (DPN) is the most damaging clinical manifestation, threatening patients' quality of life through the risk of foot ulceration and even amputation (Faselis et al., 2020; Khan et al., 2025; Pfannkuche et al., 2020). The pathogenesis of DPN is multifactorial, but poor glycemic control linked to a failure to modify lifestyle remains the main determinant of nerve-damage progression (Baum et al., 2021; Zhu et al., 2024). A sedentary lifestyle, inadequate dietary management, and other

unhealthy behaviors not only sustain hyperglycemia but also promote oxidative stress and inflammatory pathways that accelerate the degradation of peripheral nerve fibers (Caturano et al., 2023; Młynarska et al., 2022).

DPN is a major microvascular complication of diabetes, with a global prevalence reaching approximately 50% of the patient population (Carot-sierra, Martinez-De-Juan, et al., 2025). Its most dominant clinical form is distal symmetric polyneuropathy, which accounts for about 75% of all cases and is a leading cause of motor dysfunction and plantar ulceration (Carot-sierra, Penalva, et al., 2025). Despite its widespread impact, early detection remains difficult, and current therapeutic options inadequately address the multifactorial mechanisms of the disease (Yang et al., 2025; Yin et al., 2025). These challenges underscore the importance of modifiable behavioral factors, such as lifestyle, which can be addressed through low-cost, patient-centered interventions.

A preliminary survey conducted by the researchers at Sapta Medika Indrapura Hospital recorded 103 patients with DM between January and November 2024. Interviews with seven patients with type II DM revealed that all experienced pain and numbness, to the extent that they did not feel pain even when wounds were present or during diabetic foot care, indicating nerve damage consistent with diabetic neuropathy. These patients also reported unhealthy lifestyles, including frequent consumption of fatty and high-sugar foods and rarely exercising, resulting in excess weight; five of them additionally reported high levels of work-related stress and habitually staying up late.

Although the relationship between lifestyle and DPN is widely recognized, evidence from secondary-care settings in Indonesia, particularly in the Batu Bara region of North Sumatra, remains limited. Most existing studies are concentrated in larger urban or tertiary centers, and local data that could inform context-specific behavioral interventions are scarce. This study, therefore, aims to analyze the relationship between lifestyle and the severity of DPN among patients with DM at Sapta Medika Indrapura Hospital. It is hypothesized that an unhealthier lifestyle is significantly associated with greater DPN severity.

METHODS

This study used a descriptive-analytical design with a cross-sectional approach. It was conducted at the Internal Medicine Clinic of Sapta Medika Indrapura Hospital in Batu Bara Regency from November 2024 to April 2025. The population comprised all patients with DM who visited the clinic during the study period (N = 103). Using purposive sampling, 51 patients who met the eligibility criteria were enrolled. Inclusion criteria were: patients diagnosed with DM by a physician, conscious, able to communicate, read, and write, and willing to participate.

Exclusion criteria were patients with established complications and those unwilling to participate.

Lifestyle was measured using the FANTASTIC Lifestyle Checklist, with a healthy lifestyle defined as a score ≥ 60 and an unhealthy lifestyle as a score < 60. The severity of DPN was assessed using the Diabetic Neuropathy Score (DNS), in which a score of 0 indicates no DPN and a score of 1–4 indicates the presence of DPN.

Primary data were collected directly by the researcher from respondents at the clinic. After eligible patients were identified and provided informed consent, the FANTASTIC Lifestyle Checklist and the DNS assessment were administered, and responses were recorded by the researcher. Data were analyzed using descriptive (univariate) statistics to describe the distribution of lifestyle and DPN severity, and bivariate analysis using Spearman's rho correlation test, which is appropriate for ordinal data, to examine the association between the two variables.

All respondents received an explanation of the study's purpose and procedures and provided written informed consent before participation. Confidentiality and anonymity were maintained throughout data collection, storage, and reporting, and participation was voluntary with the right to withdraw at any time.

RESULTS

Table 1. Frequency distribution of lifestyle and severity of diabetic peripheral neuropathy at Sapta Medika Indrapura Hospital, Batu Bara Regency (n = 51)

Variable	f	%
Lifestyle		
Healthy	16	31.4
Unhealthy	35	68.6
Diabetic Peripheral Neuropathy		
Mild	5	9.8
Moderate	13	25.5
Severe	33	64.7
Total	**51**	**100**

As shown in Table 1, of the 51 respondents, the majority had an unhealthy lifestyle (35 respondents; 68.6%), while 16 (31.4%) had a healthy lifestyle. With respect to DPN severity, most respondents experienced severe DPN (33 respondents; 64.7%), followed by moderate DPN (13; 25.5%) and mild DPN (5; 9.8%). The high proportion of severe cases indicates a substantial neuropathic burden among patients with DM attending this clinic.

Table 2. Correlation between lifestyle and severity of diabetic peripheral neuropathy (Spearman's rho, n = 51)

	Variable		Lifestyle	*Diabetic Perifer*
Spearman's rho	**Lifestyle**	Correlation Coefficient	1.000	0.116
		Sig		0.042
		N	51	51
	Diabetic Perifer	Correlation Coefficient	0.116	1.000
		Sig	0.042	
		N	51	51

As presented in Table 2, the Spearman's rho test produced a correlation coefficient of r = 0.116 with a significance value of p = 0.042 (p < 0.05). This indicates a statistically significant but weak positive correlation between lifestyle and the severity of DPN: as lifestyle becomes less healthy, the severity of DPN tends to increase, although the strength of this association is low.

DISCUSSION

This study found a statistically significant but weak positive correlation between lifestyle and the severity of DPN (r = 0.116; p = 0.042) among patients with DM at Sapta Medika Indrapura Hospital. The significant p-value indicates that lifestyle and DPN severity are associated, yet the low correlation coefficient shows that lifestyle alone explains only a small proportion of the variation in DPN severity. This is clinically plausible: DPN is a multifactorial complication, and factors not captured in this study, such as diabetes duration, glycemic control (HbA1c), age, dyslipidemia, visceral adiposity, and hyperuricemia, are likely to contribute substantially to its severity (Baum et al., 2021; Li et al., 2025; Pfannkuche et al., 2020; Zhang et al., 2024; Zhou et al., 2025; Zhu et al., 2024). Lifestyle should therefore be understood as one important but not the sole contributor to neuropathic progression.

The descriptive findings are themselves notable. In this clinic, 68.6% of respondents had an unhealthy lifestyle, and 64.7% already had severe DPN. The co-occurrence of a high proportion of unhealthy behavior and advanced neuropathy suggests that many patients present to secondary care at a late stage, when nerve damage is already considerable. This pattern may reflect delayed diagnosis, limited access to structured lifestyle counselling, and the high proportion of undiagnosed diabetes reported nationally (IDF, 2025; Susanti et al., 2025). For a secondary-care setting in the Batu Bara region, these data provide concrete local evidence that behavioral risk factors and severe neuropathy are highly prevalent and warrant earlier, systematic screening.

Mechanistically, unhealthy lifestyle behaviors—poor diet, physical inactivity, smoking, and chronic stress—sustain hyperglycemia and amplify oxidative stress and inflammation,

which accelerate peripheral nerve-fiber degradation (Caturano et al., 2023; Młynarska et al., 2022). This biological pathway helps explain why even a modest behavioral signal is detectable against the many other determinants of DPN. Lifestyle is defined as a collective pattern of health-related behaviors shaped by the choices available to individuals within their social, economic, and cultural context (Brivio et al., 2023; Gherasim et al., 2020; Tatiana, 2020), and unhealthy patterns—alcohol use, smoking, obesity, and physical inactivity—are well-established drivers of chronic disease (Gao et al., 2025).

These findings are broadly consistent with the wider literature, although the strength of the association reported here is weaker than in several earlier studies. Qureshi et al., (2017), screening 800 outpatients with the Michigan Neuropathy Screening Instrument, reported a significant correlation between behavioral/lifestyle factors and neuropathy severity ($p = 0.005$), while Ghavami et al., (2018)In a randomized clinical trial of 74 patients, demonstrated that a structured lifestyle intervention—targeting glycaemic control, physical activity, weight reduction, diet, and foot care—significantly reduced DPN severity ($p = 0.001$). Our results agree with the direction of these associations but not their magnitude. Several component-specific studies reinforce the plausibility of a true, if modest, lifestyle effect: a systematic review and meta-analysis of 75 studies (228,699 individuals) confirmed that smoking significantly increases the risk of diabetic neuropathy (Bader et al., 2025); umbrella- and meta-analytic syntheses found that physical-activity and exercise interventions improve postural control, gait, nerve function, and symptom burden in patients with DPN (Pang et al., 2025; Sánchez et al., 2025); and an observational study reported that greater adherence to a Mediterranean diet was associated with a lower presence of DPN (García et al., 2024).

In contrast, our weak coefficient diverges from studies that place lifestyle among the dominant determinants of severity. Recent risk-factor meta-analyses consistently rank metabolic and clinical variables—HbA1c, diabetes duration, age, female sex, nephropathy, and dyslipidaemia—above behavioral factors in predicting DPN and painful DPN (Zhou et al., 2025), and Indonesian single-center data similarly emphasize HbA1c variability and lipid abnormalities as leading correlates of neuropathic severity (Rezkiansyah et al., 2023). The discrepancy most likely reflects methodological differences: our use of an ordinal screening tool (DNS) rather than graded clinical scores, a smaller single-center sample, the predominance of already-severe cases (a ceiling effect that compresses variance), and the absence of adjustment for glycaemic and lipid confounders. Comorbid conditions that cluster with unhealthy lifestyles, such as poor sleep quality, have also been independently linked to greater

neuropathic pain and severity (Yildirim & Aras, 2025), suggesting that the lifestyle–DPN relationship is mediated through several overlapping pathways that a single bivariate correlation cannot fully capture. Positioned within this literature, our study adds local, secondary-care evidence from Indonesia and reinforces, rather than overstates, the role of lifestyle in DPN.

These findings carry practical implications for diabetes management at Sapta Medika Indrapura Hospital. Pharmacological treatment alone appears insufficient to halt nerve degradation without comprehensive behavioral modification. Healthcare professionals should integrate lifestyle education—emphasizing realistic targets and gradual, sustainable change—into routine nursing and medical care. From a service-planning perspective, the hospital may benefit from structured psychosocial support and stress-management programs, given the role of emotional stability and social support in sustaining healthy behavior. Empowering patients to manage diet, physical activity, and work–life balance could help reduce the long-term burden of neuropathic complications.

This study has several limitations. First, the cross-sectional design precludes causal inference between lifestyle and neuropathy severity. Second, lifestyle data relied on self-report instruments, which are susceptible to social desirability and recall bias. Third, the single-centre setting and modest sample size limit the generalizability of the findings to other populations and care levels. Finally, the study did not adjust for important clinical confounders such as diabetes duration and glycemic control. Future research should employ longitudinal designs, larger multicenter samples, and objective clinical parameters to strengthen the validity of these relationships.

CONCLUSIONS

Based on the analysis conducted at Sapta Medika Indrapura Hospital, this study concludes that there is a statistically significant, though weak, association between lifestyle and the severity of DPN, with less healthy behavior associated with greater neuropathic severity. These findings suggest that lifestyle is an important modifiable factor in the clinical course of diabetes-related microvascular complications and that medical interventions are best combined with structured behavioral-change strategies. Because the design was cross-sectional and the association was weak, causality cannot be inferred. Future researchers are encouraged to adopt longitudinal designs to observe the temporal dynamics between behavioral change and neurological improvement, to incorporate objective biomarkers such as HbA1c and nerve-conduction studies to minimize self-report bias, and to conduct multicenter and interventional

studies, including family-based lifestyle-empowerment programs, to reduce the risk of amputation and improve long-term functional capacity in people with diabetes.

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