



Effectiveness of Foot Reflexology on Neuropathic Pain and Emotional Well-Being among Clients with Diabetic Peripheral Neuropathy.

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KEYWORDS

Diabetic Peripheral Neuropathy, Foot Reflexology, Neuropathic Pain, Emotional Well-Being, Type 2 Diabetes.

ABSTRACT:

Introduction:

Diabetic Peripheral Neuropathy (DPN) is one of the most prevalent microvascular complications of type 2 diabetes and is associated with chronic neuropathic pain, impaired mobility, and reduced emotional well-being. Non-pharmacological interventions such as foot reflexology are increasingly explored for symptom relief and holistic care.

Objectives:

To determine the prevalence of DPN among clients with type 2 diabetes; to evaluate the effectiveness of foot reflexology in reducing neuropathic pain and improving emotional well-being; and to examine the association of neuropathic pain and emotional well-being with selected sociodemographic and clinical variables.

Methods:

A mixed-method design comprising a cross-sectional survey and an interventional study was adopted. A total of 34 participants with type 2 diabetes were screened for DPN using the Michigan Neuropathy Screening Instrument (MNSI). Eligible participants with confirmed DPN (n = 34) received standardized foot reflexology sessions for 30 minutes, 3 times per week, for 4 weeks. Neuropathic pain was measured using the Numerical Pain Rating Scale (NPRS), and emotional well-being was assessed using the WHO-5 Well-Being Index. Data were analyzed using descriptive statistics, paired t-tests, and chi-square tests.

Results:

The prevalence of DPN among clients with type 2 diabetes was found to be 34%. Foot reflexology resulted in a significant reduction in neuropathic pain (mean pre-test score 76.67 mean post-test 56.08 $p < 0.05$) and a significant improvement in emotional well-being (mean pre-test 11.91; mean post-test 15.82; $p < 0.05$). Neuropathic pain and emotional well-being showed significant associations with age, duration of diabetes, glycemic control, and presence of comorbidities.

Conclusion:

Foot reflexology is an effective complementary therapy for reducing neuropathic pain and enhancing emotional well-being among clients with DPN. Incorporating reflexology into routine diabetes care may improve patient outcomes and quality of life.

1. INTRODUCTION

Diabetic Peripheral Neuropathy (DPN) is one of the most common chronic complications of type 2 diabetes mellitus, affecting approximately 30–50% of diabetic individuals worldwide. It is characterized by sensory loss, burning pain, tingling sensations, and decreased proprioception. Persistent neuropathic pain not only affects functional ability but also contributes to anxiety, depression, and poor emotional well-being.

Conventional management of neuropathy focuses primarily on pharmacological measures. However, long-term medication use often results in limited relief or undesirable side effects. Foot reflexology, a complementary therapy based on stimulating reflex points on the feet corresponding to body organs, has shown promising results in improving nerve function, circulation, and psychological well-being.

Despite growing interest in alternative therapies, there is limited empirical evidence in the Indian context



regarding the effectiveness of foot reflexology for DPN. This study was undertaken to assess the prevalence of DPN, evaluate reflexology as an intervention, and analyze contributing sociodemographic and clinical factors.

2. OBJECTIVES

This study aims to:

1. Determine the prevalence of Diabetic Peripheral Neuropathy among clients with type 2 diabetes.
2. Evaluate the effectiveness of foot reflexology in reducing neuropathic pain and improving emotional well-being among clients with DPN.
3. Examine the association of neuropathic pain and emotional well-being with selected sociodemographic and clinical variables.

3. METHODS

3.1 Study Design

A mixed-method approach consisting of a cross-sectional survey and a pre-experimental one-group pre-test post-test design for intervention.

3.2 Study Setting and Participants

Participants were recruited from Kirangere and Paduvanagere Villages of Ramanagara District Karnataka. Inclusion criteria included adults diagnosed with type 2 diabetes for at least one year, with confirmed DPN. Clients with foot ulcers, deformities, or peripheral vascular disease were excluded.

3.3 SAMPLE SIZE:

34 clients with Diabetic Peripheral Neuropathy were chosen for this study.

3.4 SAMPLING TECHNIQUE:

Non probability convenience sampling technique was used for this study

3.5 SAMPLING CRITERIA

INCLUSION CRITERIA:

- Clients with type 2 diabetes diagnosed with peripheral neuropathy.
- Clients available at the time of data collection.
- Clients willing to participate in the study.

- Clients able to understand Kannada.

EXCLUSION CRITERIA:

- Clients diagnosed newly or (< 5 years) with type 2 diabetes.
- Clients with peripheral neuropathy related to disease conditions other than diabetes.

3.6 DESCRIPTION OF THE TOOL:

As the study is aimed at evaluating the effectiveness of Foot Reflexology Therapy on reducing neuropathic pain and improving emotional well-being among clients with Diabetic Peripheral Neuropathy (DPN) in selected areas, the following instruments were used for data collection:

- Section A: Socio-demographic Variables and Clinical Variables
- Section B: Michigan Neuropathy Screening Instrument (MNSI)
- Section C: Neuropathic Pain Symptom Inventory (NPSI)
- Section D: WHO-5 Well-Being Index

3.7 Screening for DPN

The Michigan Neuropathy Screening Instrument (MNSI), comprising a questionnaire and physical assessment, was used to identify DPN.

3.8 Intervention: Foot Reflexology

A standardized reflexology protocol was administered foot reflexology sessions for 30 minutes, 3 times per week, for 4 weeks. A trained therapist performed all sessions to ensure uniformity.

3.10 Outcome Measures

Neuropathic Pain: Numerical Pain Rating Scale (0–10)

Emotional Well-Being: WHO-5 Well-Being Index

3.11 Data Analysis

Data were analyzed using SPSS Version 30. Descriptive statistics summarized demographic data. Paired t-tests evaluated intervention effectiveness. Chi-square tests examined associations.



4. RESULTS

4.1 Description of selected demographic variables of clients with peripheral neuropathy in type 2 diabetes.

Table 4.1 Frequency and Percentage distribution of demographic variables.

(n=34)

Socio-Demographic Variable	Category	Frequency (n)	Percentage (%)
Age (in years)	a) 31–40	0	0
	b) 41–50	5	15
	c) 51–60	13	38
	d) 61–70	13	38
	e) 71 and above	3	9
Gender	a) Male	19	56
	b) Female	15	44
Religion	a) Hindu	34	100
	b) Muslim	0	0
	c) Christian	0	0
	d) Others	0	0
Marital Status	a) Single	0	0
	b) Married	28	82
	c) Divorced/Separated	0	0
	d) Widowed	6	18
Educational Level	a) No formal education	16	47
	b) Primary	18	53
	c) Secondary	0	0
	d) Higher Secondary & above	0	0
Material Conditions	a) Very good	10	29
	b) Good	9	26
	c) Poor	7	21
	d) Very bad	8	24
Occupation	a) Sedentary worker	0	0
	b) Moderate worker	22	65
	c) Heavy worker	12	35



Monthly Income (₹)	a) <10,000	8	24
	b) 10,000–15,000	9	26
	c) 16,000–20,000	10	29
	d) 21,000 & above	7	21
Living Arrangements	a) Alone	0	0
	b) With family	34	100
	c) Assisted living facility	0	0
Dietary Preferences	a) Vegetarian	10	29
	b) Non-vegetarian	24	71
Habits	a) Smoking	5	15
	b) Alcohol	6	18
	c) Both	6	18
	d) No habits	17	50

The socio-demographic profile of the 34 participants indicates that the sample predominantly consisted of older adults, with nearly half (47.06%) aged above 61 years and an additional 38.24% in the 51–60-year age group. Males represented a slight majority (55.88%), and all participants identified as Hindu. Most respondents were married (82.35%), while a smaller proportion (17.65%) were widowed. Educational status showed that over half (52.94%) had primary education, whereas 47.06% were illiterate. Material living conditions varied widely, with 29.41% reporting very good conditions and 23.53% indicating very poor living conditions. More than two-thirds of the participants (64.71%) were moderate workers, and all lived with their families. Monthly income levels also differed, with nearly one-third earning ₹16,000–20,000, while others earned either below ₹10,000 (23.53%) or above ₹21,000 (20.59%). Dietary habits revealed that a majority (70.59%) were non-vegetarian. Half of the participants reported no habits, while others consumed alcohol (17.65%), smoked (14.71%), or engaged in both behaviors (17.65%). These findings provide valuable insight into the socio-demographic and lifestyle characteristics of the study population.

4.2 Prevalence of DPN

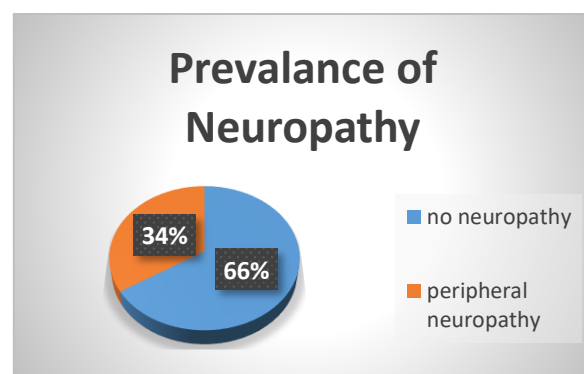


Figure 4.1 Prevalence of DPN

The findings from the Michigan Neuropathy Screening Instrument administered to 100 clients with type 2 diabetes revealed that a majority, 66% (n=66), did not exhibit symptoms indicative of Diabetic Peripheral Neuropathy (DPN). However, a considerable proportion—34% (n=34)—demonstrated symptoms suggestive of DPN. This indicates that more than one-third of the study population is already experiencing neuropathic manifestations, highlighting the substantial burden of neuropathy among individuals with type 2 diabetes. These results underscore the importance of routine neuropathy screening in diabetic populations for



early identification, timely intervention, and prevention of further complications.

4.3 Effectiveness of Foot Reflexology

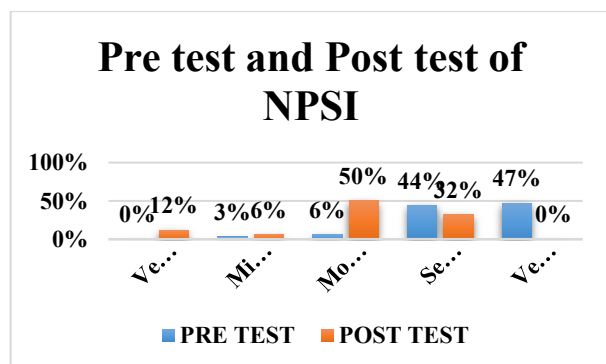


Figure 4.2 Effectiveness of Foot Reflexology

The comparison of pre-test and post-test scores on the Neuropathic Pain Symptom Inventory (NPSI) demonstrates a notable reduction in pain severity following the intervention. In the pre-test, a substantial proportion of participants reported severe (44%) and very severe pain (47%), indicating a high baseline level of neuropathic discomfort. However, post-test results revealed a marked shift toward lower pain categories, with no participants reporting very severe pain and only 32% remaining in the severe pain category. Additionally, moderate pain increased significantly to 50% in the post-test, suggesting that many participants transitioned from higher to moderate levels of discomfort. Mild and very mild pain also showed slight increases (6% and 12%, respectively), further supporting an overall reduction in pain intensity. These findings highlight the effectiveness of the intervention in decreasing neuropathic pain severity among the participants.

Table 4.4 Comparison of neuropathic pain symptom inventory (NPSI) scores before and after foot reflexology intervention

		Mean	SD	Mean Difference	T value	P value
NPSI	Pre - test	76.67	11.80	20.59	9.064	<0.001
	Post - test	56.08	17.12			

The analysis of neuropathic pain scores using the Neuropathic Pain Symptom Inventory (NPSI) revealed a significant improvement following foot reflexology therapy among clients with diabetic peripheral neuropathy. The mean pre-test score was 76.67 ± 11.80 , indicating a high level of neuropathic pain prior to the intervention. After the administration of foot reflexology, the mean post-test score decreased substantially to 56.08 ± 17.12 , demonstrating a clear reduction in pain intensity. The mean difference of 20.59 between pre- and post-test scores, along with a calculated t-value of 9.064 and a p-value < 0.001 , confirms that the reduction in neuropathic pain was statistically significant. Consequently, the null hypothesis (H_{01}) was rejected and the alternate hypothesis (H_1) was accepted, providing strong evidence that foot reflexology is an effective non-pharmacological intervention for reducing

neuropathic pain among individuals with diabetic peripheral neuropathy.

4.5 Association with Sociodemographic and Clinical Variables

The findings of the present study demonstrated significant associations between neuropathic pain severity and several key demographic and clinical variables. Pain severity in the pre-test was notably higher among older participants, with a significant association observed between age and neuropathic pain ($\chi^2 = 19.41$, $p = 0.004$), suggesting that advancing age may contribute to increased vulnerability to diabetic peripheral neuropathy. Duration of diabetes was also strongly linked to pain intensity, with individuals having diabetes for more than 11 years reporting markedly higher pain levels ($p < 0.01$). Additional significant associations were identified between neuropathic pain and HbA1c



levels ($p < 0.05$), as well as the presence of comorbidities ($p < 0.05$), indicating the multifactorial nature of neuropathic symptom severity. Emotional well-being was influenced by educational status, occupation, duration of diabetes, and family support (all $p < 0.05$), highlighting the interplay between clinical, socioeconomic, and psychosocial factors. These results underscore the need for comprehensive, individualized approaches in the management of diabetic peripheral neuropathy.

5. DISCUSSION

The study revealed a high prevalence of DPN among individuals with type 2 diabetes, consistent with global epidemiological trends. Foot reflexology produced significant reductions in neuropathic pain and improvements in emotional well-being. These findings align with previous research indicating that reflexology enhances peripheral circulation, stimulates nerve pathways, and promotes relaxation.

The significant associations between pain levels and clinical variables highlight the multifactorial nature of DPN. Positive changes in emotional well-being suggest that reflexology not only alleviates physical symptoms but also contributes to psychological stability.

The findings of this study reinforce the growing body of evidence supporting the use of complementary therapies such as reflexology in the management of chronic diabetic complications. The significant reduction in neuropathic pain observed following the reflexology intervention may be attributed to improved microcirculation, activation of pressure receptors, and enhanced nerve signaling pathways in the feet. These physiological responses align with previous studies suggesting that reflexology stimulates peripheral nerve endings, resulting in improved nerve conduction and reduced nociceptive transmission. The improvement in emotional well-being further supports the holistic impact of such interventions, indicating that pain relief may directly influence psychological states, including anxiety and distress commonly associated with chronic complications of diabetes.

Another important aspect highlighted by the study is the strong association between clinical variables—such as duration of diabetes and glycemic control—and neuropathic symptom severity. Poorly controlled

diabetes is known to accelerate nerve damage, and the present findings underscore the importance of early screening and consistent glycemic regulation in preventing or delaying the onset of DPN. This also explains why participants with longer disease duration or multiple comorbidities exhibited higher baseline neuropathic pain. The interaction between physiological and psychological factors observed in this study emphasizes the need for integrated diabetes care models that address not only biomedical aspects but also emotional and psychosocial components of disease management.

Furthermore, the observed improvement in emotional well-being following reflexology suggests potential benefits that extend beyond symptom management. Chronic pain often leads to reduced social engagement, sleep disturbances, and diminished quality of life. Reflexology, by promoting relaxation and inducing parasympathetic activation, may help break this cycle, contributing to improved mood, better coping mechanisms, and enhanced overall well-being. These multidimensional benefits suggest that reflexology can serve as a valuable adjunct to standard diabetic care. However, further randomized controlled trials with larger sample sizes and longer follow-up periods are recommended to validate the sustained effects of reflexology and explore its role in long-term neuropathy management.

6. CONCLUSION

Foot reflexology is a feasible, safe, and effective complementary therapy for managing neuropathic pain and improving emotional well-being in clients with DPN. Integrating reflexology into diabetes care protocols may enhance holistic patient outcomes.

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