



BUERGER -ALLEN EXERCISE: A NON-PHARMACOLOGICAL NURSING INTERVENTION FOR MANAGING PERIPHERAL CIRCULATION IN DIABETIC NEUROPATHY

Nursing

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ABSTRACT

Chronic diabetes frequently triggers microcirculatory decay, with diabetic neuropathy standing as a primary driver of impaired peripheral blood flow. This study was designed to evaluate whether Buerger-Allen exercises (BAE) could serve as a practical, bedside strategy to restore this lost circulation. A pre-experimental, one-group pre-test post-test study was conducted with 50 patients diagnosed with diabetic neuropathy, selected by purposive sampling. The BAE was performed three times daily. The researcher tracked patient's progress using the Noninvasive Monitoring Assessment Scale. At the start of the study, patients exhibited sluggish perfusion, with mean circulation scores of 17.6 in the right leg and 16.62 in the left. Following the three-week intervention, these scores saw a dramatic clinical shift, dropping to 6.54 and 6.44, respectively. Statistical findings suggest that Buerger-Allen exercises are more than just a legacy technique; they are a potent, zero-cost, non-pharmacological tool. For nurses and clinicians, BAE offers a scalable way to enhance peripheral perfusion and potentially stall the progression toward more severe diabetic foot complications.

KEYWORDS

INTRODUCTION:

The 2023 ICMR-INDIAB study highlights a massive crisis, estimating that 101 million people are already living with the disease, while another 136 million are currently in a pre-diabetic state. This isn't just a national health hurdle; it's a full-blown epidemic. What's even more concerning is how this affects the body over time. Recent data from various Indian medical institutes suggests that diabetic peripheral neuropathy (DPN) is rampant, with prevalence rates hitting between 39.3% and 52.7% in specialized clinics. The real danger, however, is the "silent" nature of the condition. In nearly half of these patients, the nerve damage is completely painless. Because they don't feel the typical burning or tingling, the diagnosis is often missed until a silent foot ulcer develops, at which point the risk of amputation becomes a terrifying reality.

Persistent high blood sugar causes microvascular damage and oxidative stress. The consequences of this diabetes in India are stark: 15% of diabetics face foot ulcers, and these wounds are responsible for 80% of non-traumatic amputations every year. Diabetic foot complications impose a shocking economic burden. In India, the direct medical costs for managing diabetic foot ulcers (DFU) are often driven by long hospitalizations and surgeries. Globally, the total economic burden of diabetes for India is estimated at \$ 11.4 trillion for the 2020–2050 period. In many cases, DPN care accounts for more than one-fourth of the total direct medical costs associated with diabetes. Non-pharmacological strategies like Buerger-Allen exercises are essential because they provide a high-value, low-cost alternative to expensive medications that often carry side effects.

A research studies indicate that BAE promotes lower extremity perfusion (LEP) by using gravity to facilitate venous return and arterial inflow and it effectively improving the Ankle-Brachial Index (ABI) scores in diabetic patients.

METHODS

A quantitative and evaluative research approach, with pre-experimental one-group pre-test post-test design was used. The study was conducted at Sachithanadha Diabetes center, with total of 50 samples. The samples were patients with diabetic neuropathy and they were selected by purposive sampling technique. Inclusion criteria specified patients aged between 41-85 years who were diagnosed with diabetic neuropathy with symptoms like erythema, numbness, tingling, and edema. The Noninvasive Monitoring of Peripheral

Circulation Assessment Scale was used to measure the level of peripheral circulation.

Intervention Protocol

The Buerger-Allen exercise performed by the patients themselves (self-performing). The exercises consist of three phases: leg elevation (45–60° for 2 minutes), dependency (sitting on the edge of the bed with feet hanging down for 2 minutes), and resting (supine position for 5 minutes). This cycle was performed for a total of 20 minutes, three times per day with 3-hour intervals, for a period of 21 days.

Ethical Considerations

The study was conducted after approval from the Institutional Ethical Committee of Swami Vivekananda College of Nursing, Dharmapuri. The informed consent was obtained from all 50 participants after explaining the study's purpose and their right to withdraw at any time. To maintain confidentiality, data were coded, all personal data were hidden during analysis. The exercise has no physical, financial risk and it is a safe, no cost, and non-pharmacological nursing intervention.

RESULTS

The study showed a statistically significant effectiveness in enhancing peripheral circulation among all 50 participants after 21-day intervention of Buerger-Allen exercises (BAE).

Levels Of Peripheral Circulation

The effectiveness of the intervention was monitored using the Noninvasive Peripheral Circulation Assessment Scale. In this scale, maximum scores indicate poor circulation, while lower scores indicate improved blood flow.

Table 1: Comparison Of Pre-test And Post-test Scores (N=50)

Assessment	Pre-test Mean	Post-test Mean	Mean Difference	Paired t-test Value
Right Leg	17.60	6.54	11.06	6.82 Significant (p < .05)
Left Leg	16.62	6.44	10.18	6.61 Significant (p < .05)

Table 1 shows that mean scores reduced significantly from 17.60 to 6.54 (Right Leg) and 16.62 to 6.44 (Left Leg). The calculated t-test values (6.82 and 6.61) are more than the table value, confirms that differences are statistically significant (p < 0.05), and serves as an

evidence for the effectiveness of intervention.

Table 2: Frequency Distribution Of Circulation Levels (N=50)

Circulation Grade	Right Foot (Pre)	Right Foot (Post)	Left Foot (Pre)	Left Foot (Post)
Good	0%	66%	0%	70%
Slightly Poor	66%	28%	70%	26%
Poor	28%	6%	26%	4%
Very Poor	6%	0%	4%	0%

Table 2 reveals a changes in the circulation before and after intervention. Before the study, 0% of patients had 'Good' circulation. After 21 days of Buerger-Allen exercises, 66% (Right) and 70% (Left) had 'Good' circulation and there were no 'Very Poor' grade.

Association With Demographic Variables

The data were analyzed to find out association between demographic variables and level of peripheral circulation before intervention. Findings revealed that, there was no significant association between the level of circulation and age, gender, dietary pattern, duration of diabetes and other associated illness. There was significant association with the **duration of diabetic neuropathy**. Patients who had diabetic neuropathy for more than 4–10 years, typically had poorer circulation scores compared to those with a recent diagnosis.

DISCUSSION

The results revealed that, the intervention significantly enhanced peripheral circulation among patients with diabetic neuropathy, as evidenced by a significant reduction in mean scores. In pretest, all samples (100%) had impaired circulation at different levels, with no one in the 'Good' level. After 21 days of intervention, 66% of right foot assessments and 70% of left foot assessments showed 'Good' level, proves that the primary hypothesis was true.

These findings align with international research. study by John and Rathiga (2020) similarly found that BAE significantly reduced peripheral neuropathy symptoms ($p < .001$). Recent clinical studies have also proved that regular BAE significantly increases Ankle-Brachial Index (ABI) scores and reduces capillary refill time (CRT) in diabetic patients. Furthermore, a many studies suggests that, non-pharmacological intervention helps in reduction of blood glucose levels by increasing insulin sensitivity through muscular activity.

CONCLUSION:

This study concludes that Buerger-Allen Exercise is a mandatory procedure, not an optional. The evidence is strong and clear: 50 patients showed a improvement in circulatory impairment within three weeks of intervention. For a progressive and fatal diabetic neuropathy, BAE is a accessible, no cost, non-pharmacological and highly effective treatment.

Nursing Implications

The BAE serves as a cost-effective, safe, and easily taught procedure for self-care. It motivates patients to take an active role in their care and also, potentially reducing the risk of dangerous complications like diabetic foot ulcers and amputations. Nurses should incorporate BAE as a health education into routine diabetic care protocols in both clinical and community settings to enhance better long-term vascular health.

Recommendations

Digital Integration: Recommending, mobile apps or SMS reminders for patients at home. The simple exercise, thrice a day, significantly prevents major complications through digital nudges.

Family-Centered Care: Since many elderly patients in India live in joint families, recommending the training of family caregivers as "co-therapists" to assist with more accurate intervention.

Early-Stage Intervention: While this study focused on patients with neuropathy, future nursing research should focus on pre-diabetic patients. If circulation can have improved before the nerves die and may prevent damage to nerves

Conflict Of Interest: None

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