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A STUDY TO ASSESS THE EFFECTS OF CONTRAST FOOT BATH THERAPY ON NEUROPATHY PAIN AMONG PATIENT WITH DIABETES MELLITUS

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ABSTRACT

Introduction: Diabetes neuropathy is one of the most common and debilitating complications associated with both Type I and Type II diabetes mellitus. Neuropathy pain is often difficult to manage with pharmacological measures alone, and non-pharmacological interventions are increasingly being explored to provide additional relief. One such effective complementary therapy is contrast foot bath therapy, which involves the alternation of hot and cold water immersion. **Aim:** The present study was conducted to evaluate the effectiveness of contrast foot bath therapy on neuropathy pain among diabetes mellitus patients at a selected hospital in Coimbatore**. Methods:** A study of one group pre and post-test design. By using non – probability, purposive sampling technique, a total of 60 patients of diabetes mellitus were selected based on inclusion and exclusion criteria. The background variables were assessed by interview technique and, the level of neuropathy pain was assessed by using Lanss pain scale before the intervention. **Results and Conclusion:** The results of the independent t-test revealed a statistically significant improvement. Overall, the Total Score decreased from 15.6 to 4.67, with a high t-value of 6.09 ($p = 0.05$), confirming that the intervention was highly effective in reducing symptoms across all dimensions. The significance Levels across all domains ($p < 0.05$) indicate that the changes observed are statistically significant and not due to chance.

KEYWORDS: Diabetes mellitus, Neuropathy pain, Contrast foot bath therapy.

INTRODUCTION

Diabetes is undoubtedly one of the most significant health issues of the 21st century. According to the International Diabetes Federation, diabetes is the biggest global disease of our time, affecting almost 450 million people world wide Neuropathy pain is linked to a rise in prescriptions and an increase in visits to healthcare providers Patients commonly report a unique array of symptoms, characterized by sensations similar to burning and electric shocks, along with pain triggered by non-painful stimuli (such as gentle touching); these symptoms tend to persist and often become chronic, showing less responsiveness to pain relief medications., anxiety, and depression are prevalent and intense in individuals suffering from neuropathic pain, and the quality of life is more significantly compromised in those with chronic neuropathy pain. **(Luana et.al).**

A contrast foot bath basically serves as a "pump," letting blood to flow into the inflammatory area and helping to push fluid into the lymphatic and blood stream while eliminating the toxins and metabolite buildup. To keep the foot pain-free from neuropathy, warm and cold treatments should be given at 3-minute intervals and 1-minute intervals for three cycles.

Statement of the problem

"A study to assess the effectiveness of contrast foot bath therapy on neuropathy pain among patients with diabetes mellitus at selected hospital, Coimbatore."

OBJECTIVES

- To assess the pre and post-test level of neuropathy pain among patient with diabetes mellitus in experimental and control group.
- To evaluate the effect of contrast foot bath therapy on neuropathy pain among patient with diabetes mellitus in experimental group
- To associate between pre-test levels of neuropathy pain among patient with diabetes mellitus with selected demographic variables.

Operational definitions Asses

It refers to the measurement of pre and posttest level of neuropathy pain among patient with diabetes mellitus by using LANSS neuropathy pain scale.

Effectiveness

It refers to the outcome of contrast foot bath therapy on level of neuropathy pain among diabetes clients which was assessed by using LANSS Neuropathy Pain Scale.

Contrast foot bath therapy

It refers to the alternative immersion of the feet in warm water (37.7- 40.5°c) for 3 minutes and cold water (15.5°-21°c) for 1 minute alternatively which repeated for 3 cycles with the duration of 12 minutes for four weeks.

Neuropathy Pain

Neuropathy pain refers to the chronic pain resulting from injury to the central or peripheral nervous system. In this study neuropathy pain refers to the discomfort experienced in the feet manifested by sharpness, dullness,

itching and overall unpleasantness among patient with type I and type II diabetes

Patient with Diabetes Mellitus

It refers to the client diagnosed with type I or type II diabetes mellitus for more than 5 years and having complaints of neuropathy pain in the feet.

Hypotheses

H1: There is a significant difference between the pre and post-test level of neuropathy pain among patient with diabetes mellitus in experimental and control group.

H2: There is a significant association between contrast foot bath therapy and neuropathy pain among patient with diabetes mellitus with selected demographic variables in experimental and control group.

C**onceptual frame work**

The conceptual framework for this study was grounded in Widen Bach's helping art of clinical Nursing was composed of three key elements.

Identification

The study refers identification of diabetes mellitus patients having neuropathy pain using demographic and clinical variables and assessment of neuropathy pain using "LANSS Neuropathy Pain scale".

Ministration

In this study ministration refers to the administration of contrast foot bath therapy to the client foot was immersed fully in hot water basin for (37.7-40.5 C) 3 minutes followed by cold water basin (15.5-21C) for 1minute.Then it was repeated for 3 cycle with the duration of 12 minutes The temperature of the water was maintained constant throughout the procedure by frequently adding hot or cold water.

Validation

The steps involve the post-test assessment after ministering the contrast foot bath therapy and the comparison /analysis to infer the outcome.

Feedback – if there was reduction in the level of neuropathy pain after providing foot bath therapy enhancement of the intervention was encouraged.

REVIEW OF LITERATURE

2.1 Reviews related to diabetes and neuropathy pain

Harveen et.al., (2020) A cross-sectional investigation on the prevalence of peripheral neuropathy and related pain in individuals with diabetes mellitus. The study comprised patients aged 18 years or older who had been diagnosed with diabetes mellitus. To evaluate the related painful symptoms, the S-LANSS questionnaire was utilized. The chi-square test was used to calculate the association. A p-value of less than 0.05 was deemed statistically significant. SPSS v22 was used for all statistical analysis. According to the results, the DPN was 28.85%, and 88% of the patients had unpleasant symptoms. Significant correlations between DPN and the duration of diabetes (p=0.004), lipid control (p=0.03), and various co morbidities of diabetes, including nephropathy (p=0.002), were found. There was no correlation between neuropathy and either hypertension or retinopathy. It was discovered that the painful DPN was positively correlated with both the duration of diabetes (>15 years) and HbA1c (>9%). The study's findings

showed a high prevalence of DPN and that it was substantially correlated with the length of diabetes, cholesterol control, and nephropathy.

2.1 Reviews related to contrast foot bath therapy on level of neuropathy pain among clients with diabetes mellitus.

Alahakoon et al. (2022) concluded that hydrotherapeutic techniques, including contrast baths, may yield clinically meaningful reductions in neuropathic pain intensity and improve functional outcomes, though methodological differences among studies warrant further rigorous research.

Sree ranjini S.et al.,(2024) conducted a study to assess the effect of contrast bath on level of neuropathic pain among patients with type2 diabetes mellitus. The study used quantitative approach using pre-test post-test control group design(quasi experimental). Hence the hypothesis is statistically significant difference in neuropathic pain after contrast bath among patients with type 2 diabetes mellitus, was accept.

Strobel et al. (2025) Alexandra Strobel and colleagues conducted a randomized clinical trial examining non-pharmaceutical physical treatments, including heated stone foot bath and galvanic bath therapy, in patients with diabetic distal sensorimotor polyneuropathy. Both intervention groups experienced improvement in neuropathy outcomes and inflammatory biomarkers, indicating potential value of physical therapies in symptom management.

METHODOLOGY

Research approach - Quantitative research approach

Research design - A Quasi experimental pretest –posttest with control group design were adopted in to his study

Population Target population: diabetes mellitus patient.

Accessible population ; diabetes mellitus patient with type I, type II diabetes mellitus on neuropathy pain who admitted in selected hospital Coimbatore

Sampling technique

It was a non-probability purposive sampling technique. used for this study.

Sample size

A total of 60 clients with diabetes mellitus who fulfill the inclusive criteria with 30 each in experimental and control group.

Inclusion Criteria

The patient who were

- aged18 years and above type I and type II diabetes mellitus with five years of chronicity.
- having neuropathy who have good peripheral pulses in the lower extremities
- hospitalized patient

Exclusion Criteria

The patient who were:

- Intolerance to cold/warm temperature, severe visual/hearing impairment.
- under went surgery in lower limb, patient with loss of sensation in the foot.

The tool comprises of three components such as section A, section B, section C

Section A: Socio demographic variables

Section B: Clinical variable

Section c: Lanss pain scale

DATA COLLECTION PROCESS

The Researcher was arranging the diabetes patient in allotted room and prepare for the needed hot water and cold water. Then the researcher introduce herself, and the researcher explain how to do contrast foot bath therapy to the Clients in the experimental group was take in to the treatment room one by one for the contrast foot bath therapy. The investigator used 2 basins with water (one for hot water and one for cold water).The temperature of hot water will100-105degreeF and for cold water 60-70 degree F.

- Immediately after the intervention, within 5-10 minutes' post test level of neuropathy pain was assessed using LANSS neuropathy pain scale.

DATA ANALYSIS

Section I: Distribution of socio-demographic variables and clinical profile of neuropathy pain among patients with diabetes mellitus.

Section II: Assessment of pre and posttest level of neuropathy pain among patients with diabetes mellitus in experimental and control group.

Section III: Effectiveness of neuropathy pain among patients with diabetes mellitus in experimental and control group.

Section IV: Association between pretest level of neuropathy pain with selected variables in experimental and control group.

Table No 1: Frequency and percentage distribution of Socio-demographic variables among patients with diabetes mellitus.

n=60

S. no	Demographic variables	Experimental group (n=30)		Control group (n=30)	
		(f)	(%)	(f)	(%)
1	Age of the patient 30-40years	9	30	8	26.7
	41-50years	2	6.7	4	13.3
	51-60years	9	30	2	6.7
	Above 61years	10	33.3	16	53.3
2	Sex Male	10	33.3	17	56.7
	Female	20	66.7	13	43.3
3	Education Uneducated	4	13.3	16	53.3
	Primary education	6	20	4	13.3
	Secondary education	6	20	8	26.7
	Professionals	14	46.7	2	6.7
4	Occupation Unemployed	3	10	16	53.3
	Government	16	53.3	2	6.7
	Private	6	20	4	13.3
5	Monthly Income BelowRs.5000	5	16.7	13	43.3
	$.5001-10000	3	10	6	20

	$. 10001-15000	7	23.3	8	26.7
	AboveRs.15001	15	50	3	10
6	Religion Hindu	21	70	23	76.7
	Muslim	4	13.3	4	13.3
	Christian	5	16.7	3	10
7	Type of family Nuclear family	21	70	23	76.7
	Joint family	8	26.7	4	13.3
	Extended family	1	3.3	3	10
8	Type of Diet Vegetarian	5	16.7	3	10
	Non-vegetarian	4	13.3	5	16.7
	Mixed	21	70	22	73.3
9	Body Mass Index Normal	18	60	20	66.7
	Underweight	3	10	4	13.3
	Obese	9	30	6	20
10	Social habits Alcohol	3	10	4	13.3
	Smoking	2	6.7	3	10
	Both A&B	3	10	3	10
	None of the above	22	73.3	20	66.7
11	Place of Residence Rural	17	56.7	19	63.3
	Urban	7	23.3	8	26.7
	Semi-urban	6	20	3	10

Table No 4.1.2: Frequency and percentage distribution of clinical variable among patients with diabetes mellitus in experimental group and control group

n=60

Table No 2: Frequency and Distribution of assessment of level neuropathy pain among patients with diabetes mellitus.

S. No	Clinical variables	Experimental group (n=30)		Control group(n=30)	
		(f)	(%)	(f)	(%)
1	What type of DM you have? Type I	0	0	0	0
	Type II	30	100	30	100
2	Duration of Diabetes mellitus Lessthan5year	10	33.3	6	20
	5-10years	11	36.7	7	23.3
	Morethan10years	9	30	17	56.7
3	Treatment for diabetes mellitus OHA	17	56.7	19	63.3
	Insulin	6	20	8	26.7
	Both	7	23.3	3	10
4	Random Blood sugar On the day of admission 100-200mg/dl	17	56.7	18	60
	200-300mg/dl	6	20	5	16.7
	Above300mg/dl	7	23.3	7	23.3
5	HBA1C blood glucose level Below 6.5mm0l/l	24	80	18	60
	6.5-7.6mmol/l	4	13.3	5	16.7
	Above7.7mmol/l	2	6.7	7	23.3
6	Duration of neuropathy pain	12	40	10	33.3

	<6month				
	6month-1year	7	23.3	8	26.7
	1year-2year	2	6.7	5	16.7
	morethan2year	9	30	7	23.3
7	Site of neuropathy pain occurrence Foot	23	76.7	20	66.7
	Ankle	7	23.3	7	23.3
	Hand	0	0	3	10
8	Do you have any diabetes foot ulcer Yes	0	0	0	0
	No	30	100	30	100
9	Relieving factors of neuropathic pain Massage	17	56.7	13	43.3
	Relaxation Therapy	4	13.3	5	16.7
	Topical application	9	30	12	40
10	Time of pain Morning	9	30	3	10
	Afternoon	9	30	3	10
	Evening	5	16.7	14	46.7
	Night	7	23.3	10	33.3
11	Any co–morbid illness Yes (Asthma, Hypertension, Thyroid)	13	43.3	18	60
	No	17	56.7	12	40
12	Previous history of any surgery Yes	4	13.3	6	20
	No	26	86.7	24	80
13	Presence of Paresthesia Yes (Right/Left/Both)	17	56.7	18	60
	No	13	43.3	12	40
14	Do you have been under going treatment for neuropathy pain. Ayurveda	2	6.7	6	20
	Yunani	0	0	2	6.7
	None of the above	28	93.3	22	73.3

Sl. No	Scoring	Experimental Group (n=30)				Control Group (n=30)			
		Pre test		Post test		Pre test		Post test	
		f	%	f	%	f	%	F	%
1	<12 un likely	3	10%	24	80%	2	6.7%	6	20%
2	=12 border line	8	26.7%	5	16.7%	4	13.3%	5	16.7%
3	>12 likely	19	63.3%	1	3.3%	24	80%	19	63.3%

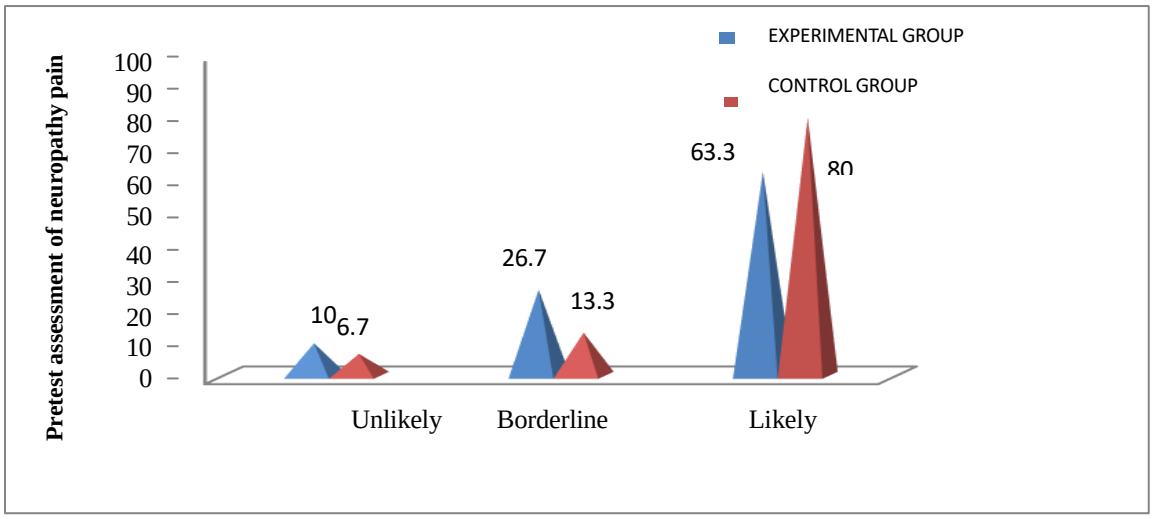

Fig No. 2.1: Frequency and percentage distribution of pretest assessment of neuropathy pain among patients with diabetes mellitus.

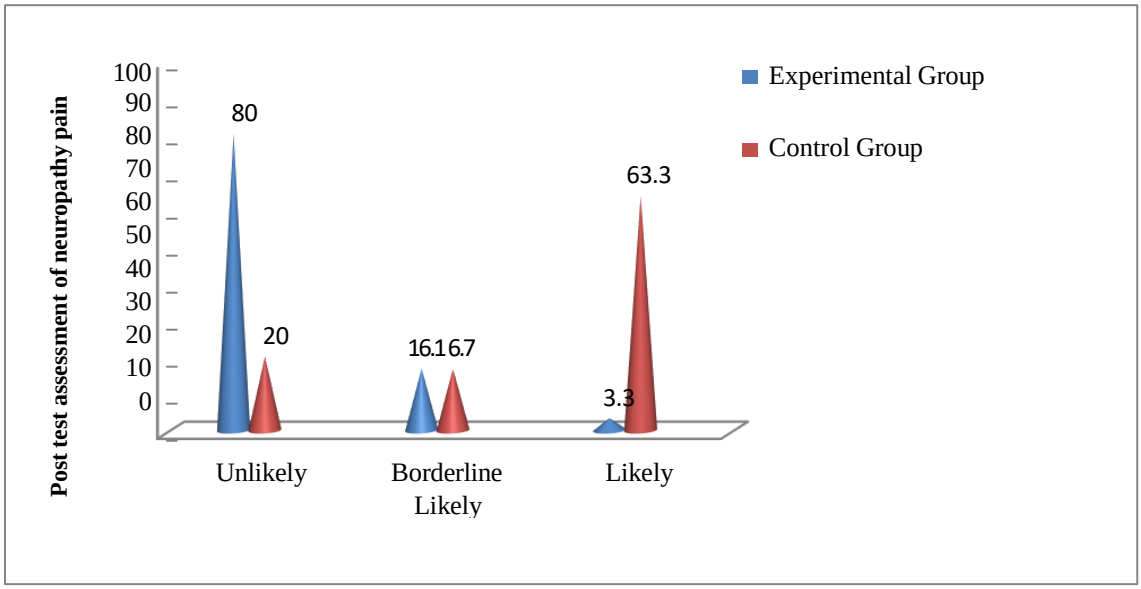

Figure No2. 2: Frequency and percentage distribution of post test assessment of neuropathy pain among patients with diabetes mellitus.

Table 3 shows that Comparison of mean, mean value, standard deviation and 't' test value of pretest and posttest level of neuropathy pain among patients with diabetes mellitus.

Sl. No	Groups	Assessment	Mean	Standard Deviation	't' value
1	Experimental Group	Posttest	302	1.7	7.18*(s)
2	Control Group	Posttest	512	5.06	

*significant at <0.05level

Table No 4: Association between pretest level of neuropathy pain score in socio demographic variable in the experimental group and control group. n=60

S. No	Demo graphic variables	Criteria	Experimental Group				Control Group			
			Unlikely Neuropathy Pain	Borderline	Likely Neuropathy pain	X2 Value	Unlikely Neuropathy Pain	Borderline	Likely Neuropathy Pain	X2 Value
1.	Body Mass Index	Normal	1	1	16	21.37* df=4 (P=9.48) (S)	1	2	15	5.05 df=4 (P=9.48) (NS)
		Underweight	2	0	1		2	1	2	
		Obese	0	5	4		0	2	7	
2	Relieving factors of neuropathic pain	Massage	1	1	15	13.54* df=4 (P=9.48) (S)	1	2	10	2.70 df=4 (P=9.48) (NS)
		Relaxation Therapy	1	1	2		0	1	4	
		Topical application	1	6	2		1	1	10	
3	Any co – morbid illness	Yes (Asthma, Hyper tension n, Thyroid)	3	2	8	9.18* df=2 (P=5.99) (S)	2	2	14	1.32 df=2 (P=5.99) (NS)
		No	0	6	11		0	2	10	

RESULTS

- Majority of the age group is above 61years, 10 (33.3%)
- Majority was, 20(66.7%) were females.
- Majority was, 14(46.7%) were professionals.
- Majority was 16(53.3%)were working in Government sector
- Majority was Nuclear family, 21(70%).
- Majority of the people was taking mixed diet 21(70).
- Majority was 30(100%)belongs to type II diabetes mellitus
- Regarding Duration of DM, (36.7%) were5-10years.s.
- Majority of the people was taken oral hypoglycemic agent 17(56.7%),
- Duration of neuropathy pain was less than 6months 12(40%)
- Majority of people having pain on foot Site 23(76.7%)
- Majority of the people having co morbidity illness experimental group, 17(56.7%)
- Majority of people there was no history of surgery, 26(86.7%)
- Table No 2. shows that, despite 30 patients in the experimental group, the majority (22, 73.3%) belong to the unlikely category, 5 (16.7%) belong to the borderline category, and 3 (10%) belong to the likely category. Whereas in the control group, the majority of them belong to unlikely 19(63.3%), 5(16.7%) belong to borderline 6(20%) belong to likely neuropathy pain.
- Table No 3. reveals that in experimental group, the mean score was 490 in the pretest and 302 in the posttest. The paired ‘t’ value was 6.09. This shows that, there was an effective in contrast foot bath therapy among patients with diabetes mellitus. In control group, theme an score was 583 in pre test and 512 in post test level. The paired ‘t’

value was 1.97. Here, the calculated value (6.09) is more than the table value (2.045) at 5%level of significance. Thus, there is a significant difference between the pre and post-test level of neuropathy pain among the experimental and control group. The contrast foot bath therapy is effective. Hence, the research hypothesis (H1) is accepted.

- Table 4 revels that, demographic variables of the pretest experimental group, such as body mass index may influence the effectiveness of contrast foot bath therapy on neuropathy pain. This shows that, there is a significant association between contrast foot bath therapy and neuropathy pain among patient with diabetes mellitus with selected demographic variables. Hence, the research hypothesis (H2) is accepted.

Limitation

- The study was limited to the adult with loss of sensation in the foot
- Study can be conducted comparing the effect of neuropathy pain in diabetes
- patient who is taking pain medication for neuropathy

Recommendation for further study

- The contrast foot bath therapy works well for joint pain in the elderly patient
- It works both clinical and community environment.

Nursing Education

- Nursing college can educate the students to regarding contrast foot bath therapy as intervention while educating the nursing students on care of patient with neuropathy pain among patients with diabetes mellitus and educate to written nursing care plan.

Nursing practice

- Contrast foot bath therapy can be initiated who admitted in the wards for inpatients as a nursing intervention for diabetes patients under the supervision of investigator and patients could be motivated to follow the same at home.

Nursing Administration

Nurse administrator can collaborate with doctors to include contrast foot bath therapy as a routine practice in the ward, for all the diabetic patients with neuropathy pain.

Nursing Research

Based on these findings, research can be done to assess the effect of contrast foot bath therapy for neuropathy pain among diabetes patients.

CONCLUSION

Diabetes is the most common causes of peripheral neuropathy diabetes peripheral neuropathy is a leading cause of world wide disability affecting the life of diabetic patient in all spheres. dpn is associated with chronic pain ,high risk of falls causing functional impairment and altered activities of daily living. there is an alarming concern for quality –based cost –effective nursing care for patients with diabetes peripheral neuropathy .life style intervention has a vital role in preventing pain among patient with diabetes peripheral neuropathy by increasing blood flow and vascular pumping to extremities .thus it enhance the functional ability and activities of daily living of patients with dm there by improving their quality of life as near to normal.

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