

A Pre-Experimental Study to assess the Effectiveness of Specific Nursing Intervention on Low Back Pain Among Patients with Intervertebral Disc Prolapse at selected hospital, Chennai

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Abstract

Intervertebral discs are also a major cause of low back pains even without herniation because they are vulnerable to torsional injuries and internal disc dislocation. The production of pain is usually associated with either chemical or mechanical stimulation of the nerve endings in the annulus fibrosus. The current research was designed to assess the efficacy of a specific nursing intervention that would help to decrease the cases of low back pain in the group of patients with intervertebral disc prolapse and hospitalized in one of the chosen hospitals in Chennai. A general systems theory formed the conceptual framework that informed the current study and pre-experimental design was used. The participants were selected through a non-probability purposive method to sample 60 participants. Numerical Pain Rating Scale (NPRS) was used to measure the baseline pain intensity. After the pre-test assessment, intervention included the education of the subjects on correct body mechanics and use of hot fomentation. The level of pain was measured again with the same NPRS tool at the end of the intervention. The findings revealed the mean pre-test pain group was 6.88 with SD (1.79) that reduced to 2.15 with SD (1.14) in post-test. The t-test value ($t = 17.276$, $p < 0.001$) confirmed the statistical significance of the decrease in pain, with the mean difference in pain being 4.73. These results show that the targeted nursing interventions of proper body mechanics training and hot application are quite effective in the management of low back pain in patients with intervertebral disc prolapse.

Keywords: Inter vertebral disc prolapse, Low back pain, Specific Nursing intervention.

1.Introduction

The disc that exists between the vertebrae (the intervertebral disc, or IVD) is essential in keeping the spine in a healthy state. It is structurally a fibrocartilaginous cushion, the main joint between two adjacent vertebrae. There are 23 intervertebral discs in the human spine, with six located in the neck (cervical region), twelve in the mid-back (thoracic region), and five in the lower back (lumbar region)(1). These disks enable the spine to be flexible and more importantly strong and stable. They also provide shock absorbing functions to distribute mechanical loads and avoid direct contact between vertebrae. The main elements of each of the discs are the nucleus pulposus (NP), or gel-like central core; the annulus fibrosus (AF), fibrous outer ring; and the cartilaginous endplates, which connect the disc to the other spine vertebrae.

2. Need for the Study

One of the primary causes of the degeneration of the intervertebral disc (IVD) is a cause of discogenic low back pain (LBP), one of the most common causes of disability in the world(2). The incidence of disc degeneration is about 26-42 percent of the total cases of low back pain and thus a serious health issue. This is mostly prevalent in people aged 30 to 50 years and the highest prevalence is in this age group. Moreover, the probability of disc herniation at the level of L4/5 or L5/S1 (the most frequent sites of injuries) is close to 95 percent in people between the ages of 25 and 55 years. Although disc disease is a common aetiological factor, it is determined to be the leading cause affects fewer than 5% of back pain patients overall, which explains the necessity of a specific research and suitable interventions.

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3. Problem Statement

A pre-experimental study the effectiveness of specific nursing intervention on lowback pain among patients with intervertebral disc prolapse at selected hospital, Chennai.(3).

Objectives

- To assess the level of low back pain among patients with intervertebral disc prolapse.
- To evaluate the effectiveness of specific nursing intervention on low back pain among patients with intervertebral disc prolapse.
- To assess the association between the level of lowback pain with selected variables.

Hypotheses

- H1: There is a significant difference in the level of low back pain among patients with intervertebral disc prolapse after the specific nursing intervention.
- H2: There is a significant association between the level of low back pain among the patients with intervertebral disc prolapse with their selected demographic and clinical variables.

4. Conceptual Structure

A conceptual framework is a systematic interpretation of the phenomenon being studied and is an expression of the assumptions made and philosophical views behind the study. It is constructed on the basis of major concepts and their correlations. This study has a conceptual framework based on the General System Theory (GST) by a biologist, Ludwig von Bertalanffy (1967). Bertalanffy defined a system as a combination of interrelated parts, which collaborate towards the accomplishment of a given objective. Human being can also be considered a system because he/she has the input as he/she gets the input of the environment, processes it and gives output.

This is a cyclical process and it depends on an on-going interaction between input, throughput, output and feedback. Any change in one aspect impacts on the whole system. The feedback, whether the system or the external environment, gives the necessary information that allows the system to modify its processes to give the desired result(4). The patient is the system in the current research, the nursing intervention is the input, the intervention process is the throughput, the pain reduction is the output, and the post-test evaluation is the feedback(whether the objective of reducing pain was met or not).

5. Methodology

Research methodology is the systematic way of approaching a research problem and it includes methods of collecting data, methods of interpreting data and making conclusions following research. It is the roadmap towards carrying out a research(5).

Research Design:

In this study, a pre-experimental one-group pre-test post-test research design was used to test the effectiveness of a particular nursing intervention on low back pain in patients with intervertebral disc prolapse.

Data Collection Procedure:

On Day 1, the participants were asked to provide demographic and clinical variables. Numerical Pain Rating Scale (NPRS) was used to measure the level of low back pain during the pre-test level. After this, the investigator applied a nursing intervention, which comprised of:

- 15minute show of good body mechanics.
- Hot fomentation 15-20 minutes twice a day during three days.
- The level of low back pain was determined again on Day 3 using the same tool of NPRS.

Study Setting:

It was carried out in the Orthopaedic General Wards of Sri Venkateswaraa Medcity, Chennai as a 700- bed multi-specialty hospital, which receives approximately 250- 300 orthopedic patients monthly(6).

Population:

The study targeted the entire population of all patients with the diagnosis of intervertebral disc prolapse and low back pain. The population available entailed patients hospitalized due to the intervertebral disc prolapse and low back pain at the time of carrying out the study at Sri Venkateswaraa Medcity.

Sampling Methodology and Sample size:

Participants were recruited using a non-probability purposive approach. The patients were chosen as both male and female of the age between 30years to 80years; 60 patients were included in total(7).

Section I

Frequency and Percentage Distribution of Demographic Variables among Patients with Intervertebral Disc Prolapse

TABLE 1 Frequency and Percentage Distribution of Demographic Variables **n = 60**

S.No	Demographic Variables	Experimental group	
		Frequency (f)	Percentage (%)
1	Age in years		
	30 – 40	23	38.4
	41 – 50	17	28.3
	51 – 60	15	25.0
	61 – 70	5	8.3
	71 – 80	-	-
2	Gender		
	Male	18	30.0
	Female	42	70.0
3	Religion		
	Hindu	49	81.7
	Christian	8	13.3
	Muslim	3	5.0
	Others	-	-
4	Marital status		
	Married	56	93.3
	Unmarried	3	5.0
	Single	1	1.7
	Widower	-	-
	Separated	-	-
5	Educational qualification		
	Illiterate	13	21.7
	Primary (1 – 5 th std)	2	3.3
	Middle (6 – 8 th std)	6	10.0
	High school (9 – 10 th std)	7	11.7
	Higher Secondary (11, 12 th std)	10	16.6
	Graduate	22	36.7
6	Occupation		
	Government employee	-	-

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S.No	Demographic Variables	Experimental group	
		Frequency (f)	Percentage (%)
	Private employee	38	63.3
	Self employee	9	15.0
	Unemployed	13	21.7
	Retired	-	-
7	Monthly income		
	Below Rs.20,000	31	51.7
	20,001 – 30,000	22	36.6
	30,001 – 40,000	6	10.0
	Above 40,000	1	1.7
8	Type of family		
	A joint family	16	26.7
	A nuclear family	44	73.3
9	Diet pattern		
	Vegetarian	-	-
	Non-vegetarian	-	-
	Mixed	60	100.0
10	Duration of low back pain		
	Less than one year	37	61.7
	1 – 3 years	21	35.0
	4 – 5 years	-	-
	More than 5 years	2	3.3
11	Family history of inter vertebral disc prolapse		
	Yes	1	1.7
	No	59	98.3
12	Personal habits		
	Alcoholism		
	Yes	7	11.7
	No	53	88.3
	Smoking		
	Yes	6	10.0
	No	54	90.0

S.No	Demographic Variables	Experimental group	
		Frequency (f)	Percentage (%)
	Exercise		
	Yes	3	5.0
	No	57	95.0

Table 1 Gives the frequency and percent distribution of demographics of the patients with inter vertebral disc prolapse. In age terms, most of the participants were found in the categories 30-40 years (38.4%), 17 (28.3%), 5 (25%), and 5 (8.3), respectively. None of the participants fell between the ages of 71-80 years. In terms of gender, 42 (70 percent) were women and 18 (30 percent) were men. Religiously, the majority of participants 49 (81.7%) were members of the Hindu religion, then 8 (13.3) Christians and 3 (5) Muslims. With regard to marital status, 56 (93.3) were married, 3 (5) were unmarried and 1 (1.7) was single. Regarding education, 22 (36.7) were graduates, 13 (23.7) illiterate, 10 (16.6) higher secondary school, 11 (7.7) high school, 6 (10%) middle school and 2 (3.3) primary school. On occupation, 38 (63.3) were the employees of privates, 9 (15) were self-employed, 13 (21.7) were unemployed, and 2 (6.7) were government employees. Regarding monthly income, 31 (51.7%) had monthly income less than 20,000, 22 (36.6) between 20,001 and 30,000, 6 (10) between 30,001 and 40,000, and 1 (1.7) more than 40,000. On type of family it was found that 44 (73.3) were nuclear families and 16 (26.7) joint families(8). The proportion of all participants that followed a mixed diet pattern was 60 (100%). Regarding the time of pain, 37 (61.7%) had a low back pain that lasted less than one year, 21 (35.0) lasted 1-3 years, and 2 (3.3) lasted over 5 years. In terms of family history of intervertebral disc prolapse, 59 (98.3) reported no such history, and 1(1.7) reported positive family history. When it came to lifestyle habits, 53 (88.3) never drank alcohol whereas 7 (11.7) did. Likewise, 54 (90%) of them were non-smokers, 6 (10%) smoked. Also, 57 (95%) did not regularly exercise, and 3 (5%), exercised.

Section II

Prevalence and Percentage Distribution of Clinical Characteristics of Patients with Intervertebral Disc Prolapse

TABLE 2 Clinical Variables' Frequency and Percentage Distribution **n = 60**

S.No	Clinical Variables	Frequency (f)	Percentage (%)
1	BMI		
	Below 18.5 (Underweight)	-	-
	18.5-24.9 (Healthy)	26	43.3
	25-29.9 (Obese)	29	48.4
	>30 (Overweight)	5	8.3
2	Co-morbidities		
	Diabetes mellitus	7	11.7
	Hypertension	10	16.7
	Diabetes mellitus and hypertension	9	15.0
	Hypothyroidism	-	-
	Cardiac disease	-	-
	None	34	56.6
3	Previous history of hospitalization related to orthopedic problem		

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S.No	Clinical Variables	Frequency (f)	Percentage (%)
	Yes	2	3.3
	No	58	96.7
4	Previous surgical history of hospitalization related to orthopedic problem		
	Yes	-	-
	No	60	100.0
5	Congenital anomalies related to spinal problems		
	Yes	-	-
	No	60	100.0
6	History of accident		
	Yes	-	-
	No	60	100.0
7	MRI scan findings		
	Mild	33	55.0
	Moderate	27	45.0
	Severe	-	-

Table 2 Shows the frequency and percentage distribution of clinical variables levels among patients with intervertebral disc prolapse. Concerning Body Mass Index (BMI) 29 (48.4) respondents were obese, 26 (43.3) respondents were in healthy weight and 5 (8.3) respondents were overweight. No participants were underweight. In terms of comorbidity, 10 (16.7) had hypertension, 7 (11.7) had diabetes mellitus, and 9 (15) had both diabetes and hypertension. No participants reported hypothyroidism or cardiac diseases. On prior hospitalization concerning orthopedic issues, 58 (96.7%) had no prior hospitalizations and 2 (3.3) had prior hospitalization. The participants were free of any previous orthopedic surgeries, spinal disorders or accidental injuries, and on the basis of MRI findings, 33 (55) participants had mild intervertebral disc prolapse, and 27 (45) participants had moderate intervertebral disc prolapse(9).

Section III

Assessment of Patients with Intervertebral Disc Prolapse for Low Back Pain

TABLE 3 Assessment of Low Back Pain **n = 60**

Level of Low Back Pain	Pretest		Post Test	
	F	%	F	%
Not experiencing any discomfort (0)	-	-	-	-
Pain that is not too severe (1–3)	-	-	55	91.7
Pain that is moderate (4–6)	23	38.3	5	8.3
Severe pain (7 – 10)	37	61.7	-	-

Table 3 Shows the percentage and frequency of the levels of low back pain in patients with intervertebral disc prolapse of pre-test and post-test. The levels of pain were classified into no pain, mild pain, moderate pain and severe pain. During the pre-test, most respondents, 37 (61.7%), experienced severe pain whereas 23 (38.3%),

experienced moderate pain. All the participants did not experience mild or no pain during the pre-test. The results of the post-tests following the application of the nursing intervention were significant improvement in pain levels. Most of the participants, 55 (91.7) reported mild pain and only 5 (8.3) still had moderate pain. None of the participants complained of severe pain, post-intervention. These data prove that the level of pain among the patients with intervertebral disc prolapse is significantly decreased after the introduction of the particular nursing intervention..

Section IV

The impact of several nursing interventions on patients with intervertebral disc prolapse who have low back pain

TABLE 4 Effectiveness of Specific Nursing Interventions **n = 60**

Assessment	Mean	S.D	Mean Difference score	Paired 't' test & p-value
Pre test	6.88	1.79	4.73	t=17.276 p=0.0001, S***
Post-test	2.15	1.14		

***p<0.001 S – Significant

Table 4 Shows demonstrate the effectiveness of specific nursing interventions in reducing low back pain among patients with intervertebral disc prolapse. The mean pre-test pain score was 6.88 ± 1.79 , which decreased substantially to 2.15 ± 1.14 in the post-test. The paired t-test value ($t = 17.276$) was statistically significant at $p = 0.001$, and the mean difference of 4.73 indicates that the targeted nursing interventions were highly effective in alleviating low back pain in this patient population.

Section V

The association between certain clinical and demographic factors and low back pain in patients with intervertebral disc prolapse.

TABLE 5.1 Correlation of Low Back Pain with Selected Demographic Variables **n = 60**

S.No	Demographic Variables	Mild		Moderate		Severe		Chi-Square & p-value
		F	%	F	%	F	%	
1	Age in years							$\chi^2=1.994$ df=3 p=0.574 (NS)
	30 – 40	22	36.7	1	1.7	-	-	
	41 – 50	16	26.7	1	1.7	-	-	
	51 – 60	13	21.7	2	3.3	-	-	
	61 – 70	4	6.7	1	1.7	-	-	
	71 – 80	-	-	-	-	-	-	
2	Gender							$\chi^2=0.260$ df=1 p=0.610 (NS)
	Male	17	28.3	1	1.7	-	-	
	Female	38	63.3	4	6.7	-	-	

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S.No	Demographic Variables	Mild		Moderate		Severe		Chi-Square & p-value
		F	%	F	%	F	%	
3	Religion							$\chi^2=1.224$ df=2 p=0.542 (NS)
	Hindu	44	73.3	5	8.3	-	-	
	Christian	8	13.3	0	0	-	-	
	Muslim	3	5.0	0	0	-	-	
	Others	-	-	-	-	-	-	
4	Marital status							$\chi^2=11.377$ df=2 p=0.003 S**
	Married	52	86.7	4	6.7	-	-	
	Unmarried	3	5.0	0	0	-	-	
	Single	0	0	1	1.7	-	-	
	Widower	-	-	-	-	-	-	
	Separated	-	-	-	-	-	-	
5	Educational qualification							$\chi^2=3.929$ df=5 p=0.560 (NS)
	Illiterate	11	18.3	2	3.3	-	-	
	Primary (1 – 5 th std)	2	3.3	0	0	-	-	
	Middle (6 – 8 th std)	6	10.0	0	0	-	-	
	High school (9 – 10 th std)	7	11.7	0	0	-	-	
	Higher secondary (11, 12 th std)	10	16.7	0	0	-	-	
	Graduate	19	31.7	3	5.0	-	-	
6	Occupation							$\chi^2=1.406$ df=2 p=0.495 (NS)
	Government employee	-	-	-	-	-	-	
	Private employee	36	60.0	2	3.3	-	-	
	Self employee	8	13.3	1	1.7	-	-	

S.No	Demographic Variables	Mild		Moderate		Severe		Chi-Square & p-value
		F	%	F	%	F	%	
	Unemployed	11	18.3	2	3.3	-	-	
	Retired	-	-	-	-	-	-	
7	Monthly income							
	Below Rs.20,000	29	48.3	2	3.3	-	-	$\chi^2=12.102$ df=3 p=0.007 S
	Rs.20,001 – 30,000	21	35.0	1	1.7	-	-	
	Rs.30,001 – 40,000	5	8.3	1	1.7	-	-	
	Above 40,000	0	0	1	1.7	-	-	
8	Type of family							$\chi^2=3.099$ df=1 p=0.078 (NS)
	Joint family	13	21.7	3	5.0	-	-	
	Nuclear family	42	70.0	2	3.3	-	-	
9	Diet pattern							-
	Vegetarian	-	-	-	-	-	-	
	Non-vegetarian	-	-	-	-	-	-	
	Mixed	55	91.7	5	8.3	-	-	
10	Duration of low back pain							$\chi^2=0.223$ df=2 p=0.894 (NS)
	Less than one year	34	56.7	3	5.0	-	-	
	1 – 3 years	19	31.7	2	3.3	-	-	
	4 – 5 years	-	-	-	-	-	-	
	More than 5 years	2	3.3	0	0	-	-	
11	Family history of inter vertebral disc prolapsed							$\chi^2=0.092$ df=1 p=0.761 (NS)
	Yes	1	1.7	0	0	-	-	
	No	54	90.0	5	8.3	-	-	
12	Personal habits							

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S.No	Demographic Variables	Mild		Moderate		Severe		Chi-Square & p-value
		F	%	F	%	F	%	
	Alcoholism							$\chi^2=0.368$ df=1 p=0.544 (NS)
	Yes	6	10.0	1	1.7	-	-	
	No	49	81.7	4	6.7	-	-	
	Smoking							$\chi^2=0.606$ df=1 p=0.436 (NS)
	Yes	5	8.3	1	1.7	-	-	
	No	50	83.3	4	6.7	-	-	
	Exercise							$\chi^2=0.287$ df=1 p=0.592 (NS)
	Yes	3	5.0	0	0	-	-	
	No	52	86.7	5	8.3	-	-	

p < 0.01, S – Significant, N.S – Not Significant

Table 5.1 The investigation looked at how post-test levels of low back pain in patients with intervertebral disc prolapse related to demographic characteristics. The findings showed that post-test pain levels were substantially correlated with monthly income ($\chi^2 = 12.102$, $p = 0.007$) and marital status ($\chi^2 = 11.377$, $p = 0.003$) at $p < 0.05$.

TABLE 5.2 Correlation of Low Back Pain with Selected Clinical Variables **n = 60**

S.No	Clinical Variables	Mild		Moderate		Severe		Chi-Square & p-value
		F	%	F	%	F	%	
1	BMI							$\chi^2=3.053$ df=2 p=0.217 (NS)
	Below 18.5 (Underweight)	-	-	-	-			
	18.5-24.9 (Healthy)	22	36.7	4	6.7	0	0	
	25-29.9 (Obese)	28	46.7	1	1.7	0	0	
	>30 (Overweight)	5	8.3	0	0	0	0	
2	Co-morbidities							$\chi^2=3.774$ df=3 p=0.287 (NS)
	Diabetes mellitus	6	10.0	1	1.7	0	0	
	Hypertension	10	16.7	0	0	0	0	

S.No	Clinical Variables	Mild		Moderate		Severe		Chi-Square & p-value
		F	%	F	%	F	%	
	Diabetes mellitus and hypertension	7	11.7	2	3.3	0		
	Hypothyroidism	-	-	-	-	0	0	
	Cardiac disease	-	-	-	-	0	0	
	None	32	53.3	2	3.3	0	0	
3	Previous history of hospitalization related to orthopedic problem							$\chi^2=0.188$ df=1 p=0.665 (NS)
	Yes	2	3.3	0	0	0	0	
	No	53	88.3	5	8.3	0	0	
4	Previous surgical history of hospitalization related to orthopedic problem							-
	Yes	-	-	-	-	0	0	
	No	55	91.7	5	8.3	0	0	
5	<i>Congenital anomalies related to spinal problems</i>							-
	Yes	-	-	-	-	0	0	
	No	55	91.7	5	8.3	0	0	
6	History of accident							-
	Yes	-	-	-	-	0	0	
	No	55	91.7	5	8.3	0	0	
7	MRI scan findings							$\chi^2=2.700$ df=1 p=0.100
	Mild	32	53.3	1	1.7	0	0	

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S.No	Clinical Variables	Mild		Moderate		Severe		Chi-Square & p-value
		F	%	F	%	F	%	
	Moderate	23	38.3	4	6.7	0	0	(NS)
	Severe	-	-	-	-	0	0	

N.S – Not Significant

Table 5.2 According to the research, there was no statistically significant correlation between any of the clinical factors and the post-test levels of low back pain in individuals who had intervertebral disc prolapse ($p > 0.05$).

6. Discussion

This research paper aimed to discuss the success of a given nursing intervention in the management of low back pain in patients diagnosed of inter vertebral disc prolapse. These results clearly indicate that intervention methods of nursing care that were specifically aimed at the reduction of the intensity of pain were quite effective. The discussion combines the demographic, clinical and outcome variables in order to give a holistic picture of the results.

The findings are interpreted to indicate that the occurrence of the pain score change between the pre-test and post-test is a direct result of the nursing interventions acted in response to the experiment, which involved educating patients on good body mechanics and using hot compresses. It is likely that these interventions enhanced muscle relaxation, inflammation alleviation, and muscle encouragement of correct posture, all of which enhance pain relief.

Analytically, the statistically significant difference in the mean scores of pain is evidence that the structured nursing interventions can effectively relieve low back pain. Also, demographic factors, including marital status and monthly income were discovered to have a significant impact on the level of post-test pain, which indicates the importance of psychosocial and economic factors in pain perception and recovery. Conversely, there was no significant relationship between clinical variables indicating that pain reduction was not dependent on clinical characteristics at the baseline.

In general, the findings confirm the significance of nurse-interventions in a multidisciplinary approach in low back pain management of patients with intervertebral disc prolapse. The results are in compliance with the current literature that pays great attention to the importance of non-pharmacological approaches, which include patient education and thermotherapy in pain management.

7. Conclusion

The findings of the study are that a given combination of nursing interventions can contribute a meaningful role in the reduction of the severity of the low back pain among patients with intervertebral disc prolapse. The level of pain at the baseline was measured using Numerical Pain Rating Scale (NPRS) and demographic and clinical data were identified on the first day. The patients were then offered a structured nursing intervention, i.e., education on proper body mechanics (15 minutes) and use of hot compresses (15-20 minutes) that were administered twice a day over three days.

An evaluation of pain levels on the third day, after the intervention, showed that the level of pain significantly decreased, which proved to be the effect of the interventions. This finding demonstrates that non-complicated, low-cost, and nurse-delivered interventions like appropriate body Positioning and hot packs may be vital in the management of pain and enhancement of the quality of life of patients with intervertebral disc prolapse.

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Conflicts of interest

The authors have no conflicts of interest to declare

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