

Evaluation of the Effectiveness of Nursing Rehabilitation Program on Patients' outcome after Lumbar Vertebral Discectomy

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Abstract

Objectives: The main objective of the study is to evaluate the effectiveness of nursing rehabilitation program on patients' outcome after lumbar vertebral discectomy.

Methodology: A quasi-experimental study was conducted with the application of the pre-test and post-test approach to the study group and the control group after applying the rehabilitation program. Data were collected in two phases: first baseline data (before any intervention presented to the study group) and then after each phase of the rehabilitation program.. The study period was from the 1st of August 2022 to the 31st of December 2022. Data were analyzed by using SPSS version 23.

Results: The results of this study showed that there was a significant difference between the baseline time and after phase three in both Modified Oswestry and pain scales at P value lower than .005. In addition, no significant different relationship was found between age and gender with modified scale of disability at P value higher than .05.

Conclusions: the study concluded that nursing rehabilitation program has a significant improvement of upon patients' outcomes concerning disability related to back pain and pain.

Recommendations: The study recommended that nursing rehabilitation program should be applied for all eligible patients after lumbar vertebral discectomy. Nurses and rehabilitation teams should be encouraged and motivated to participate in training programs concerning rehabilitation processes. Establishing advanced guidelines and recommendations of post spinal surgeries rehabilitation. Conducting future research about rehabilitation for patients with lumbar vertebral discectomy.

Keywords: *Nursing rehabilitation program, lumbar vertebral discectomy.*

Introduction

Intervertebral disc disease (IDD) is one of the most common musculoskeletal problems that affect the back(1).The most frequent procedure used to treat lumbar-related problems worldwide is a lumbar discectomy(2).The majority of patients with lumbar vertebral surgery are seen by rehabilitation team during their hospitalization. In early rehabilitation, they commonly focus on resuming walking(3).

According to Fjeld et al (2019),in the United States, there are about 5 to 20 cases of a herniated disc per 1000 adults(4). It is most common in people who are in their third to the fifth decade of age. The American Academy of Orthopedic Surgeons (2018) stated that the successful recovery from low back surgery depends on regular back strengthening exercises and a gradual return to normal activity through rehabilitation(5).

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Research Method and Design

A quasi-excremental study had been applied with the use of test-retest approach for two groups of samples (study and control) during the period 1st of August 2022 to the 31st of December 2022.

Setting of the Study

In order to get valid and comprehensive data, the study has been done at Neurosurgery teaching hospital in Baghdad City/ Iraq.

Sample of the Study

A purposive sample has been selected to obtain representative and accurate data. The size of sample was (50) patients divided into two groups each one contains (25) patents as control group and study group. The study group was exposed to the nursing rehabilitation program which consists of three phases of exercises (phase 1 two weeks, phase 2 three weeks an phase 3 three weeks) while the control group was not exposed to the nursing rehabilitation program.

Ethical Considerations:

The researcher of this study received the first permission to accomplish the study from the Ethical Committee of the Nursing Faculty at the University of Baghdad. The researcher ensures that all participants receive informed consent to participate in the study. In addition, the study protocol and questionnaire were distributed to the Ministry of Planning (Central Statistical Organization) and to ministry of health to get official permission to conduct the study before data collection procedure. After that, the permission was sent to the Neurosurgery teaching hospital which gave the agreement to the researcher to do the study.

The Program and Instrument Construction

The instrument was consisting of 4 parts which are:

- 1-Self administrated sheet related to the demographic and clinical characteristics of the patient.
- 2- Arabic version of Modified Oswestry Low Back Pain Disability Questionnaire which contain 10 questions.
- 3- Analog Pain Scale (APS) to assess the level of pain
- 4- A question with (Yes or No) answer about legs' numbness.

Data Collection Method

The data were collected from (50) patients from different wards in neurosurgery science hospital. The data collection included

baseline assessment before applying the program and then after each phase of the program for both groups.

Statistical Analysis

Data were analyzed using SPSS (Statistical Package for Social Sciences) version 23.0 including both descriptive and inferential statistics. Data analysis includes descriptive statistics (frequency, percent, mean, and standard deviation), and inferential statistics (Fisher exact, Chi-square, and t-test).

Result:

Table (1): Distribution of the Study Sample According to their Demographic Characteristics

Var.	Groups	Study			Control			C.S. (*) P-value
		Freq.	%	Cum. %	Freq.	%	Cum. %	
Age Groups	26-35	5	20	20	5	20	20	$\chi^2= 17.2$ P=0.799 N.S
	36-45	11	44	64	7	28	48	
	46-55	6	24	88	7	28	76	
	56-65	3	12	100	6	24	100	
Mean \pm SD		41.8 \pm 8.1			43.4 \pm 8.7			
Gender	Male	17	68	68	13	52	52	$\chi^2=1.33$ P=0.248 N.S
	Female	8	32	100	12	48	100	
Work	Free work	13	52	52	9	36	36	$\chi^2= 1.404$ P=0.496 NS
	Housekeeper	6	24	76	9	36	72	
	Employer	6	24	100	7	28	100	
Education Levels	Read & write	3	12	12	1	4	4	$\chi^2= 1.565$ P=0.815 NS
	Primary school	6	24	36	9	33	37	
	intermediate school	6	24	60	7	29	66	
	Secondary school	5	20	80	4	17	83	
	College or Institute	5	20	100	4	17	100.0	

Table (1) displays the frequency counts for selected variables. As mentioned above, the two groups (control versus study) were equal in size. Ages of the participants ranged from < 25 to 65 years (Mean age for the study group =41.8 \pm 8.1),(Mean age for the control group=43.4 \pm 8.7), there were more male patients (68%) than females (32%) in the study group and (52%) were males and (48%) female in the control group. Most common work of the study group participants was free work (52%) also in control group, it was the most frequent work in the same percent (36%) with housekeeper. The most common educational levels were primary and intermediate school (24%) in the study group while primary school was the highest percentage (33%) in the control group. These findings would suggest that the randomization process provide an acceptable level of equality between the groups. Statistically, there are no significant difference among, gender, work and level of educational, when analyzed by Chi-Square test.

Table (2): Distribution of the study samples (study and Control) according to the clinical data.

Var.	Groups	Study			Control			C.S. (*) P-value
		Freq.	%	Cum. %	Freq.	%	Cum. %	
First presence of signs and symptoms	Less than 6 months	8	32	32	9	36	36	$\chi^2= 0.397$ P=0.820 NS
	6 - 12 months	8	32	64	6	24	60	
	More than a year	9	36	100	10	40	100	
First doctor	Less than 6 months	12	48	48	11	44	44	$\chi^2=1.022$ P=0.6

visit	6 - 12 months	8	32	80	6	24	68	NS
	More than a year	5	20	100	8	32	100	
Decision to have the surgery	Immediately after diagnosis	4	16	16	8	32	32	X ² =2.702 P=0.259 NS
	Less than 6 months	12	48	64	7	28	60	
	More than 6 month	9	36	100	10	40	100	

Table -2-shows that (36%) of the study sample and (40%) of the control group have experienced the signs and symptoms for more than one year before the surgery. However (48%) of the study group and (44%) of the control group visited the doctor for the first time in less than six months after the appearance of signs and symptoms. On the other hand, (48%) from the participants of study group have decided to do the surgery after less than six months from the diagnoses while (40%) of those in the control group took more than six months to have the surgery done. Statistically, there are no significant differences found between the Study samples (study and control) regarding the first presence of signs and symptoms, first doctor visit and when they decide to have the surgery.

Table (3) compare means of the study and control groups after (baseline, phase1,phase 2 and phase 3) assessment by using Modified Oswestry Disability Index.

	GROUP	N	Mean	Std. Deviation	t	Sig. (2-tailed)
Baseline	Study	25	55.92	14.927	.509	.613 N.S
	Control	25	53.92	12.786		
After Phase1	Study	25	47.92	14.748	-.492	.625 N.S
	Control	25	49.84	12.805		
After Phase2	Study	25	39.60	14.083	-1.287	.204 N.S
	Control	25	44.56	13.160		
After Phase3	Study	25	30.40	11.372	-3.014	.004 H.S
	Control	25	40.59	12.443		

N: no. of sample; Mean: numeric mean, Std. Deviation: standard deviation; t: T-test; P: P-value. N.S: not significant

Table (3) shows that the means of both groups were comparable for the baseline and after phase 1 assessment. However, there is slight difference in means of study group (39.6) and control group (44.56) in the assessment after phase 2 of the program. After phase 3 of the program, the mean of the study group was (30.4) while the mean of control group was (40.59). Statistically there was significant difference in mean of both groups after phase 3 assessment when they have been compared by using T-test at P-value ≤ 0.05.

Table (4) Pain’s mean score by using Analog Pain Scale (APS) for study and control groups for (baseline, after phase1, after phase2 and after phase 3) assessment.

Pain assessment	GROUP	N	Mean	Std. Deviation	t	Sig. (2-tailed)
Baseline	Study	25	6.24	1.393	.448	.656 N.S
	Control	25	6.08	1.115		
After Phase1	Study	25	3.36	1.075	.137	.892

	Control	25	3.32	.988		N.S
After Phase2	Study	25	1.96	.676	-1.307	.197
	Control	25	2.24	.831		
After Phase3	Study	25	.76	.597	-3.738	.001
	Control	25	1.52	.823		

N: no. of sample; Mean: numeric mean, Std. Deviation: standard deviation; t: T-test; P: P-value. N.S: not significant ; H.S: High significant

Table (4) reveals that the mean scores of pain for both groups were comparable at all levels of assessment except after phase 3 assessment which shows that the mean of the study group was (0.76) while the mean of the control group was (1.52). Statistically there was significant difference in mean of two groups after phase 3 assessment when compared by T-test at P value ≤ 0.005 .

Table (5) mean of (numbness) score for study and control groups for (baseline, after phase1, after phase2 and after phase 3) assessment.

Numbness assessment	GROUP	N	Mean	Std. Deviation	t	Sig. (2-tailed)
Baseline	Study	25	.68	.476	-.620	.538 N.S
	Control	25	.76	.436		
After Phase1	Study	25	.52	.586	.257	.798 N.S
	Control	25	.48	.510		
After Phase2	Study	25	.28	.458	-.885	.381 N.S
	Control	25	.40	.500		
After Phase3	Study	25	.20	.408	.000	1.000 N.S
	Control	25	.20	.408		

N: no. of sample; Mean: numeric mean, Std. Deviation: standard deviation; t: T-test; P: P-value. N.S: not significant

Table (5) shows that there is no significant differences in mean scores of numbness between the two groups in all assessment stages after they have been compared by using T-test at P value ≥ 0.05 .

Table (6) correlation between age and gender with the level of disability scored by using MODI of the study group for (baseline, after phase 1, after phase 2 and after phase 3)assessment.

Dependent Variable	Assessment	Unstandardized Coefficients		Standardized Coefficients	t	P
		B	Std. Error	Beta		
Age	Baseline	-.001	.035	-.014	-.026	.979 NS
	AfterPhase1	.079	.062	1.197	1.285	.205 NS
	AfterPhase2	-.030	.072	-.448	-.415	.680 NS
	AfterPhase3	-.036	.041	-.509	-.878	.385 NS
Dependent Variable	Assessment	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	Baseline	-.001	.035	-.014	-.026	.979 N.S

Gender	AfterPhase1	.079	.062	1.197	1.285	.205 N.S
	AfterPhase2	-.030	.072	-.448	-.415	.680 N.S
	AfterPhase3	-.036	.041	-.509	-.878	.385 N.S

Std. Error: standard error; Beta: Standardized Coefficients; t: T-test; P: P-value. N.S: not significant

Table (6) reveals that there is no significant correlation between the mean of disability level for the study group participants and their age when correlated by using Linear Regression test at P-value ≤ 0.05 . Table (6) shows that there is no significant correlation between the mean of disability level for the study group participants and their gender when correlated by using Linear Regression test at P-value ≤ 0.05 .

Discussion

Results of the present study revealed that age of the study participants ranged from < 25 to 65 years (Mean age for the study group = 41.8 ± 8.1) and (Mean age for the control group = 43.4 ± 8.7). These results were different from results that presented by Abd-El Mohsen and others in 2019, who conducted research on patients with lumbar discectomy and found that 36.7 percent of patients were less than 30 years of age (6). This could revealed that age of patients with lumbar disc herniation who perform discectomy in Iraq is different (as older) from those outside Iraq, which could reflect that younger patients are affected by disc herniation outside Iraq (the researcher). In relation to the participants' gender, there were more male patients (68%) than females (32%) in the study group and (52%) were males and (48%) female in the control group. This result was different from result of study of Abd-El Mohsen and others, who found that female patients (56.7 percent) with lumbar discectomy were more than male patients (6). This reflected that Male patients in Iraq are affected more by lumbar disc herniation than females (the researcher). Related to the job status of the study participants, most of the study group (52%) and the same percent were presented with the control group have free work. While, results of Abd-El Mohsen and others research revealed that most of the participants' were housewives (6). This result reflected that free work affect more Iraqi patients with lumbar disc herniation, while in area outside Iraq, housework can cause herniation disc (the researcher). Corresponding to the education level, the most common educational levels were primary and intermediate stage (24%) in the study group while primary school was the highest percentage (33%) in the control group. These findings would suggest that the randomization process provide an acceptable level of equality between the groups. Statistically, there are no significant difference among, gender, work and level of educational.

Results of the present study showed that (36%) of the study group and (40%) of the control group have experienced the signs and symptoms for more than one year before the surgery. However (48%) of the study group and (44%) of the control group visited the doctor for the first time in less than six months after the appearance of signs and symptoms. On the other hand, (48%) of the study group have decided to do the surgery after less than six months from the diagnoses while (40%) of participants in control group took more than six months to have the surgery done. Statistically, there were no significant differences found between the Study samples (study and control) regarding the first presence of signs and symptoms, first doctor visit, and when they decide to have the surgery. These results were disagreed by results of Abd-El Mohsen and others research who found that 83.3 percent of the study sample have no previous diseases, and more than half of the study sample have no previous surgery or even previous back surgery and accounted for 66.7 percent of patients (6). This could reflect that most of participated

Iraqi patients in this study have experienced from disorders in their lumbar vertebra and have pain for long time before visiting physicians to receive care and help (the researcher).

Results showed that the means of both groups were comparable for the baseline and after phase 1 assessment. However, there is slight difference in means of study group (39.6) and control group (44.56) in the assessment after phase 2 of the program. After phase 3 of the program, the mean of the study group was (30.4) while the mean of control group was (40.59). Statistically there was significant difference in mean of both groups after phase 3 assessment when they have been compared at $P\text{-value} \leq 0.05$. Elkan et al. (2018) presented that there was a significant difference between baseline time of patients with lumbar disorder and after surgery of discectomy in which outcomes of patients were improved(7). Abd-El Mohsen et al. (2019) presented that there were highly significant difference and improvement in patients' outcomes based on assessment of patients pre- and post- application on nursing rehabilitation program for patients with discectomy(6). Sherman et al. (2010) presented that outcome of patients with lumbar disc herniation who performed discectomy depends on the level of income, and that with improved technologies in operation the outcomes are improved significantly with decreased level of complications(8).

Results of this study revealed that the mean scores of pain for both groups were comparable at all levels of assessment except after phase 3 assessment which showed that the mean of the study group was (0.76) while the mean of the control group was (1.52). Statistically there was significant difference in mean of two groups after phase 3 assessment when compared at $P\text{ value} \leq 0.005$. This result come in agreement of results by Wang et al. (2022) who reported that upon 524 patients with lumbar vertebral discectomy number of patients experienced leg pain, back pain, and disabilities(9). Reyes et al. (2021) also reported in their study on 24 patients with lumbar disc herniation that early rehabilitation for patients with lumbar discectomy can assist in decreasing complications, decreasing pain, and improving outcomes(10). According to these listed findings, pain and disabilities of patients with herniated disc can be affected by early rehabilitation and improved surgical interventions (the researcher).

Results presented that there was no significant difference in mean scores of numbness between the two groups in all assessment stages after they have been compared at $P\text{ value} \geq 0.05$. Yan et al. (2020) reported in their study on patients with lumbar discectomy that all patients with central disc herniation who experienced pain and numbness in lower limbs before surgery are also experienced with the same features postoperative in contrast with patients who have paracentral disc herniation who experience little or no pain post operative(11). This could reflect that participated Iraqi patients have experiences numbness even after operation and rehabilitation (the researcher).

Results revealed that there was no significant correlation between the mean of disability level for the study group participants and their age at $P\text{-value} \leq 0.05$. Results showed that there was no significant correlation between the mean of disability level for the study group participants and their gender at $P\text{-value} \leq 0.05$. Ishida et al. (2012) conducted a study on 98 patients with lumbar disc herniation performed discectomy to determine factors contributing to Oswestry disability index after the operation, including age, gender, pain, numbness, and other variables(12). The authors reported that type of work and pain are the most affective factors on the score of ODI, and early rehabilitation post operative can enhance patients' outcomes. Huang and Sengupta (2014) reported upon 85 patients with lumbar herniation that patients can recover from pain within three months and from paresthesia up to one year(13).

Conclusions:

The recent study concluded that the majority of the participants of study group have decided to do discectomy surgery after less than six months from the diagnoses. In addition, nursing rehabilitation program has a significant improvement of upon patients' outcomes concerning back pain related disability and pain.

Recommendations:

The study recommends that nursing rehabilitation program should be applied for all eligible patients after lumbar vertebral discectomy. Nurses and rehabilitation teams should be encouraged and motivated to participate in training programs concerning rehabilitation processes. Establishing advanced guidelines and recommendations of post spinal surgeries rehabilitation. Conducting future research about rehabilitation for patients with lumbar vertebral discectomy.

References

- 1- Sakai D. Future perspectives of cell-based therapy for intervertebral disc disease. *Eur Spine J.* 2018; Suppl 4:452-458.
- 2- Thiru M., Annaswamy MD., Charles T. Lumbar Disc disorders. *American Academy of Physical Medicine and Rehabilitation.* Available at <https://now.aapmr.org/lumbar-disc-disorders/>; Accessed: September 25, 2018
- 3- Gilmore SJ, Davidson M, Hahne, AJ, et al.. The validity of using activity monitors to detect step count after lumbar fusion surgery. *Disability Rehabilitation.* 2018; 10.1080/09638288.2018.1509140.
- 4- Fjeld O, Grøvre L, Helgeland J, et al. Complications, reoperations, readmissions, and length of hospital stay in 34 639 surgical cases of lumbar disc herniation. *Bone Joint J.* Apr 2019;101-B(4):470-477
- 5- American Academy of Orthopedic Surgeons. *Preparing for Low Back Surgery Guide.* 2021;
- 6- Abd-El Mohsen, A, Ammar S, Mohammed H. Effect of nursing rehabilitation guide on outcomes of patients undergoing lumbar discectomy. *Journal of Nursing and Health Science,* 2019; 8(3), pp.01-11.
- 7- Elkan P, Lagerbäck T, Möller H, et al. Response rate does not affect patient-reported outcome after lumbar discectomy. *European Spine Journal,* 2018; 27, pp.1538-1546.
- 8- Sherman J, Cauthen J, Schoenberg, D, et al. Economic impact of improving outcomes of lumbar discectomy. *The Spine Journal,* 2010; 10(2), pp.108-116.
- 9- Wang S, Hebert, J, Abraham E, et al. Postoperative recovery patterns following discectomy surgery in patients with lumbar radiculopathy. *Scientific Reports,* 2022; 12(1), p.11146.
- 10- Reyes A, Aguilera M, Torres P, et al. Effects of neural mobilization in patients after lumbar microdiscectomy due to intervertebral disc lesion. *Journal of Bodywork and Movement Therapies,* 2021; 25, pp.100-107.
- 11- Yan D, Zhang Z, Zhang Z. Residual leg numbness after endoscopic discectomy treatment of lumbar disc herniation. *BMC Musculoskeletal Disorders,* 2020; 21(1), pp.1-7.
- 12- Ishida K, Tsushima E, Umeno Y, et al. Factors associated with the Oswestry disability index score one month after lumbar discectomy. *Journal of physical therapy science,* 2012; 24(5), pp.415-421.
- 13- Huang P, Sengupta D. How fast pain, numbness, and paresthesia resolves after lumbar nerve root decompression: a retrospective study of patient's self-reported computerized pain drawing. *Spine,* 2014; 39(8), pp.E529-E536.