

# Effect of Patients' Education on Their Performance and Outcomes Regarding Lumbar Disk Herniation

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## ABSTRACT

**Context:** Lumbar disc herniation is a common condition in adults and can impose a heavy burden on both the individual and society.

**Aim:** The present study aimed to evaluate the effect of patients' education on their performance and outcomes regarding lumbar disk herniation.

**Methods:** Quasi-experimental design used to achieve the aim of this study. The study was conducted at the orthopedic outpatient clinic at Benha University Hospital. A purposive sample of 60 patients of both genders aged from (18-60 years old) included in the study. Patients who were attending surgical operations regarding lumbar disk herniation excluded. Three tools were used to collect the study data. These are structured interview questionnaires regarding the patients' demographic characteristics, medical data, patient knowledge regarding lumbar disk herniation, an observational checklist for patient's practice regarding lumbar disk herniation exercises, and a modified Oswestry low back pain & disability scale.

**Result:** There was a statistically significant improvement in the total level of patient's knowledge, practices & outcomes immediately post and three months post-program implementation. Also, there was a significant statistical correlation between patients' knowledge and pain disability scale three months post-program implementation.

**Conclusion:** The study results conclude that the educational program was effective and resulted in a significant improvement in patient's knowledge, practice, and outcomes regarding lumbar disk herniation. The study suggested equips the orthopedic department with simple illustrated guidelines protocol covering lumbar disc herniation practices, knowledge; reapply this research on a more substantial probability sample acquired from different geographical areas in Egypt for generalization.

**Keywords:** Educational program, lumbar disk herniation, patients, lower back pain, satisfaction, outcomes

## 1. Introduction

Lumbar disc herniation (LDH) is one of the most common spinal degenerative disorders, which can lead to low back pain (LBP) and radicular leg pain (Yazdani, Hesari, Khosro, Anbarian, & Ghazani, 2015). It is a pathological condition that frequently affects the spine in young and middle-aged adults (Oosterhuisab, WOsteloabc, Dongenab, & Peul 2017).

Herniated lumbar disc characterized by lower limb pain radiating below the knee in an area of the leg served by one or more lumbosacral nerve roots. Sometimes, there are other neurological findings, such as sensory and motor deficits. Also, a herniated disc can press on the nerves in the spine and may cause pain, numbness, tingling, or weakness of the leg called 'sciatica' North American Spine Society (2019). However, it has been reported that LDH has not always accompanied by clinical symptoms such as LBP (asymptomatic LDH) (Yazdani et al., 2015).

Lumbar disc herniation is a significant health issue, and 60%–80% of adults are likely to experience it (Gordon & Bloxham, 2016). The incidence of LDH is estimated to be 5 per 1000 adults in Western countries (Oosterhuisab et

al., 2017). Recurrent lumbar disc herniation has been reported in widely varying incidences between 3% and 18% of the patients and depends on the duration of the follow-up (El Shazly, El Wardany, & Morsi, 2013).

Lumbar disc herniation is commonly caused by decreased muscle strength, lack of exercise, and poor posture for extended periods during activities. These factors lead to an increased load on the back, which aggravates lumbar pain. Lumbar disc herniation is classified into congenital and acquired types (Jioun Choi, Lee, Chumbaee & Jeon 2015). Depending on the severity of symptoms, treatments for a herniated lumbar disc include physical therapy, muscle-relaxant medications, pain medications, anti-inflammation medications, local injection of cortisone (epidural injections), and surgical operations. In any case, all people with a disc herniation should rest and avoid reinjuring the disc. Sometimes, even people with relatively severe pain can respond to conservative measures, including physical therapy with an exercise regimen, epidural cortisone injection, or oral cortisone medication (William, & Shiel, 2018).

Patient education is essential to be seen as an interactive process (Copanitsanou et al., 2018), including assessing the person's learning needs, preferences, and readiness to learn. The education of patients is a crucial and

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challenging aspect of care (Charalambous et al., 2017). To provide effective education, patients' age and developmental level (physical/cognitive abilities and psychosocial development) determine the most effective teaching strategies (Euro-Med Info. 2017).

Nurses play a vital role in the early detection and management of clinical deterioration because they are a group of professionals with the highest degree of patient contact (Iddrisu, Hutchinson, Sungkar, & Considine, 2018). Advanced practice nurses (APNs), in particular, have been demonstrated to improve the quality of care and patient's health (Lukosius et al., 2016). Also, it has been a lack of sufficient and consistent patient education in orthopedic nursing, as well; the desire to develop educational practices has increased in international nursing research. Nurses' educational practices and skills can vary in clinical contexts and orthopedic nursing care (Schoberer, Leino-Kilpi, Breimaier, Halfens, & Lohrmann 2016).

## 2. Significance of the study

Lumbar disc herniation is considered one of the most crucial health system problems and becomes a costly burden to society. 80% of the people suffer from it during their lifetime. It is one of the prevalent causes for referral to the physician and leading to the restriction of daily and occupational activities. LDH can occur in any disc in the spine, but the two most common forms are lumbar disc herniation and cervical disc herniation. Lumbar disc herniation occurs 15 times more often than cervical (neck) disc herniation. It is one of the most common causes of low back pain (Medline Plus Encyclopedia Herniated nucleus pulposus, 2019). About (1000) patients with the herniated lumbar disc were admitted to the orthopedic department and outside the clinic (Benha University Hospital Census, 2017).

## 3. Aim of the study

The present study aimed to evaluate the effect of patient's education on their performance and outcomes regarding lumbar disk herniation.

### 3.1. Research hypotheses

- The patient exposed to the educational program will exhibit an improved knowledge level compared to their pre-program level.
- The patient exposed to the educational program will exhibit an improved practice level compared to their pre-program level.
- The patient who is exposed to the educational program will exhibit better outcomes compared to their pre-program level.
- There will be a significant correlation between patients' knowledge and low back pain and disability scale three months post-program implementation.

### 3.2. Operational definition

*Patients' outcomes:* are intended in this study to measure patients' low back pain and disability.

*Nurses' performance:* are included in this study to assess patients' knowledge & practice regarding lumbar disk herniation.

## 4. Subjects & Methods

### 4.1. Research design

A quasi-experimental (pre/posttest) design was utilized to conduct the current study.

### 4.2. Research setting

This study was conducted in the orthopedic outpatient clinic at Benha University Hospital.

### 4.3. Subjects

A purposive sample of 60 adult patients from both genders aged from (18 - 60 years old) diagnosed a herniated lumbar disk. Patients who were attending the surgical operation of lumbar disk herniation were excluded. The sample size of patients was calculated based on the previous year's census report of admission in the orthopedic department from Benha University Hospital Census, 2017, utilizing the following formula (Yamane, 1967).

$$N = \frac{N}{1 + N(e)^2}$$

### 4.4. Tools of Data Collection

Four tools utilized in this study:

#### 4.4.1. Structured Interview Questionnaire (Pre-Program)

It was developed by the researchers based on reviewing the current literature; that used to assess patients' demographic characteristics. It is divided into two parts: Patient's medical data & patient's knowledge regarding lumbar disk herniation. It wrote in the Arabic language. Part 1 is concerned with patient's demographic characteristics & medical data. This part filled pre-program implementation only; it concerned with the patients' demographic characteristics, including (age, educational level, marital status & occupation, height, weight, and history of disease).

Part 2 embraces the patient's knowledge Questionnaire regarding lumbar disk herniation. It is utilized for testing patient's knowledge related to a lumbar herniated disk. It consists of items covering the following: Knowledge related to lumbar herniated disk (definition, causes, types, signs and symptoms, diagnosis, treatment, and protection from its complication). This tool was filled two times; the first time pre-program implementation, the second time immediately, and three months post-program implementation.

#### Knowledge scoring system

All knowledge variables were weighted according to the items included in answer to each question. The data collected from the knowledge test was computed, and the test received a grade out of 17 questions; the scores allocated as follows: complete (2), incomplete (1), wrong (0). The total score of all questions will be represented in

100% and categorized into two levels, unsatisfactory (<60%) and satisfactory (>60%).

#### 4.4.2. Patient Practice Observation Checklist

It is used to assess patient's practice regarding lumbar disk herniation exercises. It was developed by *Mcquilkie and Turesky (2008)* and adapted by the researchers. It consisted of seven exercises (spinal decompression exercise, Standing Extension exercise, Half Cobra pose exercise, Full Cobra pose exercise, Cat-Cow exercise, Plank exercise, and Bird dog exercise). This tool was filled two times; the first time pre-program implementation, the second time immediately, and three months post-program implementation.

##### Scoring system

All exercises weighted according to the items included in each exercise, and the test received a grade out of 23 items (each exercise included three items except the Bird dog exercise included five items); the scores allocated as follows: completely done (2), incompletely done (1), not done (0). The total score of all exercises will be represented in 100% and categorized into two levels, unsatisfactory (<70%) and satisfactory ( $\geq 70$ ).

#### 4.4.3. Modified Oswestry Low Back Pain and Disability Scale

It was developed by *Fritz and Irrgan (2001)* and adopted by researchers, this tool utilized to assess low back pain & disability; it included ten sections (Pain intensity, Personal care, Lifting, Walking, Sitting, Standing, Sleeping, Social life, Traveling and Homemaking). Each section contained six items, the first item in each section scored (0), the second item scored (1), the third item scored (2), the fourth item scored (3), the fifth item scored (4), the sixth item scored (5). This tool was filled two times; the first time pre-program implementation, the second time immediately, and three months post-program implementation.

##### Scoring system

For each section, the total possible score is 5: if the first statement is marked, the section score = 0. If the last statement is marked, it = 5. If all ten sections completed, the score calculated as follows;

$$\text{Score} = \frac{16 (\text{total score})}{50 (\text{total possible score})} \times 100 = 32\%$$

If one section is missed or not applicable, the score is calculated:

$$\text{Score} = \frac{16 (\text{total score})}{45 (\text{total possible score})} \times 100 = 35.5\%$$

#### 4.5. Procedures

Face and content validity were done for the tools by five Professors and expertise working in medical-surgical nursing in the nursing and orthopedic medicine department faculty at Benha University. The researchers did the necessary modifications; accordingly, the reliability of the tools was tested using the internal consistency method. It was approved to be high with Cronbach's alpha reliability

coefficients 0.914. A pilot study was carried out on six patients of study to test the questionnaire's content and estimate the time needed for data collection and the necessary modifications have done. Patients who shared in the pilot study excluded from the study sample.

The field of work went in the following sequence. Once official permission to carry out the study is obtained from relevant authorities after explaining its purpose, the patient's assessment questionnaire distributed for patients included in the study assured confidentiality obtain informed written consent. Data collection extended over six months from the beginning of August 2017 till the beginning of November 2017. The research started in April 2017 and finished in March 2019. The designed educational program comprised the following phases:

**Assessment phase:** In the beginning, the researchers visited the orthopedic clinic to collect necessary data in orthopedic clinic working days (three days /week), frequency of cases (about 2 to 6 cases per week), and agreement to conduct the research. The researchers meet the patient after registration to clinic time (9 am to 10 am) and introduce themselves; explain the aim of the study to each patient to gain their cooperation to share in the study.

The researchers initiated the data collection by interviewing each patient' for assessing demographic characteristics, medical data, and patients' knowledge by using a structured interviewing questionnaire (pre-program). Each patient was asked to answer specific questions to evaluate his knowledge about lumbar disc herniation (definition, causes, signs, symptoms, diagnosis, risk factor, treatment types, complication, prevention, type of exercise & its importance in decreasing patients' disability and pain). Also, the researchers assess the patients' practice regarding lumbar disc herniation exercises through the observational checklist and assessing patients' disability through Oswestry low back pain and disability scale (pre-program).

**Planning phase:** The researchers developed the educational program based on the explored needs, requirements, and deficiencies that translated to the aims and objectives of the program. Moreover, teaching materials were prepared, i.e., audiovisual materials related to lumbar disk herniation, which covered theoretical and practical information.

**Implementation phase:** The educational program was developed and implemented for the studied patients. They attended four sessions (2 sessions for the theoretical part, two sessions for the practical part). Regarding theoretical sessions, the first session was included a general overview of lumbar disk herniation as: (definition, causes, signs & symptoms, diagnosis, risk factor, treatment, and complications). The second session included information about (the type of exercise & its importance in decreasing patients' disability and pain regarding lumber disc herniation. The duration of each session was (15-20) minutes. A summary of essential points follows each session. At the end of the second theoretical session, the researchers have arranged another appointment for the practical sessions and take patients' telephone numbers for

communication with them. The patients attended two practical sessions (physical exercises).

Regarding the practical session, the first session included (Spinal decompression exercise, Standing Extension exercise, Half Cobra pose exercise, Full Cobra pose exercise). The second session included (Cat-Cow exercise, Plank exercises, and Bird dog exercise). The duration of each session was (20-30) minutes. Demonstration and remonstrations have been done for the patients. At the end of the practical sessions, a practical video CD about the exercise procedure has been given to each patient. Each patient provided a booklet that contained a theoretical part about herniated lumbar disk & a practical part about its exercise procedures.

Evaluation phase: Immediately after implementation of the designed educational program, patients' knowledge was evaluated by the researchers through filling the study tool 1, part 2; also, patients' practice and outcomes were evaluated using tools 2 & 3 immediately and three months post-program implementation.

Ethical considerations: This study was conducted after primary approval was obtained from the Ethics Committee, nursing faculty, Benha University. Then official permission was obtained from the director of the orthopedic department at Benha University. The study purpose was explained to participants, and they were also informed that they could withdraw from the study at any time before the completion of the study. After agreement for participation in the study, participants were asked to sign a consent form. Moreover, they reassured that all information gathered would be confidential and used only for the study.

#### 4.6. Data analysis

Upon completion of data collection through the previously mentioned tools, data were computed and analyzed using the Statistical Package for Social Sciences (SPSS), version 20.0.0.0. Data were presented in tables using numbers, percentages,  $X^2$ , P-value, and t-test. The level of significance was a threshold at 0.05.

### 5. Results

Table 1 reveals the frequency and percentage distribution of the studied patients according to their demographic characteristics. This table shows that more than half (70.0%) of the patients were in the age category ( $\geq 40$  years old). Also, 55% are males, more than three-quarters (80%) were married. Regarding residence, 60% was from an urban area, 60% had intermediate education. As well as 40% had manual work.

Table 2 shows the frequency and percentage distribution of the studied patient according to their illness-related data. It shows that, regarding means of weight ( $170.18 \pm 8.60$ ). Regarding body mass index, 45% overweight & 46.7% obese, all patients had previously admitted to hospital, and they had pain during watching T.V. and driving a car 100%. Two-thirds of the studied group (70.0%) had a herniated lumbar disk from 6 to 9 months. Moreover, most of them (83.3%) did not know the herniated lumbar disk.

Table 3 shows a frequency distribution of patient's knowledge pre-program, immediately post, and three months post-program implementation. Shows, all patients had an unsatisfactory level of knowledge pre-program. However, most patients (83.3%) had a satisfactory level of knowledge immediately post-program implementation. More than half of patients (61.7%) had a satisfactory level of knowledge after three months of implementing the program. There are statistically significant differences between knowledge pre-program, immediately, and three months post-program implementation at  $P < 0.000$ .

Table 4 shows the frequency distribution of patient's practice pre-program, immediately post, and three months of program implementation. This table shows that the majority of patients (91.8%) had unsatisfactory levels of practice pre-program. However, 90.2% had a satisfactory level of practice immediately post-program implementation. About two-thirds of patients (65.5%) had a satisfactory level of practice after three months of implementing the program, with highly statistically significant differences observed between practice pre-program and immediately post-program ( $P < 0.000$ ) and after three months as ( $P < 0.031$ ).

Table 5 presents the distribution of total pain and disability score among patient's pre-program, immediately post and after three months of implementing the program; this table reveals that there were statistically significant differences observed between total pain & disability score pre and after three months post-program implementation as paired ( $P < 0.000$ ).

Table 6 demonstrates a correlation between total knowledge score and total pain & disability score among patients after three months of implementing the program; this table reveals that there was a highly statistically significant negative correlation between patients total knowledge and their total pain & disability score after three months post-program implementation as ( $r = -0.432$  with  $P\text{-value} < 0.001$ ) inverse relationship.

**Table (1): Frequency and percentage distribution of the studied patients according to their demographic characteristics (N=60).**

Socio-demographic characteristics	No.	%
<b>Age/ years</b>		
<40	18	30
≥40	42	70
Mean±S.D	43.05±6.60	
<b>Gender</b>		
Male	33	55
Female	27	45
<b>Marital status</b>		
Not married	12	20
Married	48	80
<b>Residence</b>		
Rural	24	40
Urban	36	60
<b>Level of education</b>		
Uneducated	6	10
Read & Writes	6	10
Intermediate education	36	60
University education	12	20
<b>Job</b>		
Manual work	24	40
Employee	18	30
Housewife	18	30

**Table (2): Frequency and percentage distribution of the studied patient according to their illness-related data (n=60).**

Medical data	No.	%
<b>Height</b>		
Mean ± SD	170.18±8.60	
<b>Wight</b>		
Mean ± SD	92.41±14.58	
<b>Body mass index classification</b>		
Underweight	0	0
Average	1	1.7
Overweight	27	45
Obese	28	46.7
Morbid obese	4	6.7
Mean±SD	31.16±4.62	
<b>If pain without menstrual or stork</b>		
Yes	28	46.7
No	10	16.17
Do not know	22	36.7
<b>Previous admission to hospital due to herniated lumbar disk</b>		
Yes	60	100
No	0	0
<b>Duration of a herniated disk ( month)</b>		
3-<6 month	6	10.0
6-<9 month	42	70
More than nine month	12	20
<b>Is there Pain while watching T.V.</b>		
Yes	60	100
No	0	0
<b>Is there Pain while driving a car</b>		
Yes	60	100
No	0	0
<b>Is there Pain while doing house activity</b>		
Yes	36	60
No	6	10
<b>Taking any previous information about the disease</b>		
Yes	10	16.7
No	50	83.3

**Table (3): Comparison of patients' knowledge pre-program, immediately post, and three months of program implementation (N=60).**

Total knowledge	Preprogram		Immediately post-program		After three months		(1)*	(2)
	No	%	No	%	No	%	Chi-square p-value	Chi-square p-value
Un satisfactory	60	100	10	16.7	23	38.3	188.35	129.55
Satisfactory	0	0	50	83.3	37	61.7	<0.000	<0.000

\*(1) different between the level of knowledge Preprogram & immediately post. (2) difference between the level of knowledge Preprogram & after three months.

**Table (4): Comparison of patients' practice pre-program, immediately post, and three months of program implementation (N=60).**

Total knowledge	Preprogram		Immediately post-program		After three months		(1)*	(2)
	No	%	No	%	No	%	Chi-square p-value	Chi-square p-value
Un satisfactory	56	91.8	6	9.8	21	34.4	149.205	172.926
Satisfactory	5	8.2	55	90.2	40	65.5	<0.001	<0.031

\*(1) Different between the level of practice Preprogram & immediately post. (2) Different between the level of knowledge Preprogram & after three months

**Table (5): Mean differences of low back pain and disability scale among patients pre-program, immediately post, and after three months of implementing the program (N=60).**

Total Pain & disability scale	Preprogram		Immediately post-program		After three months		(1)	(2)
	Mean±SD		Mean±SD		Mean±SD		T-test p-value	T-test p-value
	96.40±10.126		76.23±4.40		33.60±11.57		1.703 0.094	20.036 0.000

\*(1) Difference in the mean score of pain and disability scale Preprogram & immediately post. (2) Difference in the mean score of pain and disability scale Preprogram & after three months.

**Table (6)" Correlation between total knowledge score and total pain & disability score among the studied patients after three months of implementing the program (n=60).**

Variable	r-\ p values	Total pain score	
		r-test	P-value
Total knowledge		-0.423	<0.001

**6. Discussion**

A disc herniation is considered one of the most crucial health system problems and becomes a costly burden to society. 80% of people suffer from low back pain (LBP) during their lifetime. It is one of the prevalent causes for referral to the physician and leading to the restriction of daily and occupational activities. Different mechanisms described and numerous therapeutic methods have been assigned to cope with this problem. The mechanical factors, among other factors, have been stated as the primary cause of LBP (Braddom, 2015). The present study aimed to evaluate the effect of patient's education on their performance and outcomes regarding lumbar disk herniation.

The current study shows that near to three-fourths of patients are older than 40 years old regarding demographic characteristics of studied patients. The study is consistent with Yazdani et al. (2015), who study the "effects of six-weeks exercise training protocol on pain relief in patients with lumbar disc herniation. Yazdani's study revealed that more than half of the studied subjects were (≥40 years old). This finding may be related to the physiological changes that occur in vertebrae with aging and also may be related to

decrease calcium level or improper use of body mechanics during performing activities of daily livings.

Regarding hospital admission, the present study reported that all patients were previously admitted to the hospital. This finding may be related to severe pain without previous knowledge about pain-relieving measures at home such as massage, exercises used to relieve pain, patient's distraction from pain, and guided imagery. Lack of information about these strategies for pain relief at home results in frequent patient's admission to the hospital to seek pain relief medications. This study is congruent with Shimia Ghazani, Habibzadeh, Sadat, and Habibi (2013), whose study about "Risk factors of recurrent lumbar disk herniation." The study revealed that more than three-quarters of patients were previously admitted to the hospital for pain relief. However, it is not agreed upon by Karimi (2016), whose study about "Effectiveness of controlled accelerated functional lumbar stabilization exercises on nonspecific chronic low back pain." The study indicated that more than half of the patients in his study group control their pain managed at home without hospital admission.

Concerning marital status, this study showed that about two-thirds of patients were married. This finding is consistent with Albert et al. (1993) about "Upper lumbar disc

herniation, "whose study revealed that a large number of the study subjects, about three-quarters of them, were married. Regarding residence, the present study indicates that more than half of the studied subject resides in an urban area. This finding agreed with *Bombardier (2000)*, whose study about "Outcome assessments in evaluating treatment of spinal disorders." The study revealed that about two-thirds of patients live in the urban area; this may be like 40% of them had manual work. This finding also may be related to an unhealthy diet and obesity, which increase weight stress on the patient's vertebrae and subsequently increase the risk for disc herniation.

This finding is also evidenced in this study as the mean weight of the study sample was  $92.41 \pm 14.58$ , with a body mass index of  $31.16 \pm 4.62$ ; this is consistent with *Buttermann (2004)*. Whose study about "Outcome assessments in the evaluation of treatment of spinal disorders" indicated that about two-thirds of his study group were obese.

The study also revealed that all patients experience pain during regular activity. This finding agreed with *Albert et al. (1993)*, who studies "the upper lumbar disc herniation." The study revealed that about two-thirds of the study group experience pain after performing vigorous physical activities such as carrying heavy objects.

Regarding the total patient's level of knowledge about disc herniation, the study results showed that all patients had unsatisfactory total knowledge pre-program implementation. This finding implies that patients were not equipped with at least some basic knowledge about the disease. These findings were consistent with *Carragee, Han, Suen, and Kim (2003)*, whose study about "Clinical outcomes after lumbar disk exercises" conducted a study to explore patients' knowledge and competence in performing self-care. The findings revealed that about three-quarters of the subjects have unsatisfactory knowledge about the disease process. This finding may be related to lack of exposure to such information about the disease, insufficient training on exercises and factors that may alleviate their pain, lack of patient's motivation, and improper patient's education at the time of discharge. These findings are supporting the first research hypothesis.

Regarding the total patients' knowledge, immediately and three months post-program implementation, the current study showed that most patients had a satisfactory level of knowledge immediately post-program implementation. Also, about two-thirds of patients had a satisfactory level of knowledge after three months of implementing the program, with a statistically significant difference between the three study phases. This finding may be related to lack of exposure to such information pre-program results in unsatisfactory knowledge. However, the patient's knowledge was satisfactory immediately post-program implementation. This finding may be due to practical, comprehensive, concise, clear programs, active learning methods, explicit learning materials & increased patient motivation. The satisfactory knowledge level slightly decreased after three months post-program implementation.

It may be due to a lack of patient adherence to the educational program, which may result in missing some information, and the satisfactory knowledge level decreased less than immediately post-program implementation.

The study is consistent with *Karimi (2016)*, whose study about "Effectiveness of controlled accelerated functional lumbar stabilization exercises on nonspecific chronic low back pain." The results revealed that almost all patients had unsatisfactory knowledge before program implementation. Besides, about two-thirds of his study group patients had satisfactory knowledge immediately post-program implementation, and more than half of patients had satisfactory knowledge three months post-program implementation.

Regarding the total patients' practice pre-program, immediately post, and three months post-program implementation, the current study showed that most of the patients had unsatisfactory total practice scores pre-program implementation. However, the majority of patients had a satisfactory level of practice immediately post-program implementation. The study also showed that about two-thirds of patients had a satisfactory level of practice after three months of implementing the program, with a statistically significant difference between the three phases. This finding may be related to lack of exposure to such practice and inappropriate performance of such practice pre-program implementation, which results in unsatisfactory practice.

The patient's practice was satisfactory immediately post-program implementation; this may be due to effective, clear demonstration and re-demonstration of practice about lumbar disc herniation. These results might be due to inadequate patient adherence to skills that improve health status and decrease pain perception. Whenever the level of practice slightly decreased after three months of implementing the program, this may result from a lack of follow-up to the patients' practice and acquired skills.

These findings were in agreement with *Ibrahim and Elsaay (2015)*, whose study about "The Effect of Body Mechanics Training Program for Intensive Care Nurses in Reducing Low Back Pain." The study reported that the mean practice scores of the studied nurses immediately and three months post-program implementation were higher than their pre-training scores, and this difference was statistically significant. On the same line, *Dammer and Koehler (2002)*, whose study about "Lumbar disc prolapse Level increases with age," stated a significant improvement of practice and skills about pain relief treatment among patients post-program implementation than pre-program implementation. These findings are supporting the second research hypothesis.

Concerning the distribution of patient's pain and disability scores, this study showed a statistically significant difference observed between total pain score pre-program and three months of post-program implementation — this study on the Same line with *Standaert, Weinstein, and Rumpeltes (2013)*. The study examined the "Evidence-informed management of chronic low back pain with lumbar stabilization exercises." The study indicated that

pain significantly decreased after program implementation. This finding may be due to the effect of educational programs and exercises on stabilizing muscles that become stronger so that pain will reduce. The patient will exercise better and get the ability to move correctly and save the healthy posture, so the pain cycle breaks. This finding is supporting the third research hypothesis.

The current study is congruent with Hemmati, Rajabi, Karimi, and Jahandideh, (2015) study "Effects of consecutive supervised core stability training on pain and disability in women with nonspecific chronic low back pain." The study described the effects of the educational program, stabilizing exercises, and training on decreasing the pain and improving the patients' abilities against chronic LBPs. Also, Standaert, Weinstein, and Rumpeltes (2013) have reported that stabilizing the vertebrae's exercises effectively improves the performance and relieves the pain for the various groups with the LBP.

The current study reveals a highly statistically significant negative correlation between patients' total knowledge and their total pain scale after three months post-program implementation regarding the Correlation between total knowledge and total pain scale among patients. It means that the more the patient increase in their knowledge about disc herniation and pain control measure, the little. The study is agreed with Narayan (2016), who study "Culture's effects on pain assessment and management." The study revealed that there is a significant negative correlation between patient's knowledge and pain scale score. It indicated that the higher the patients' knowledge, the more adherence to pain relieving measures & the lower patients' perception of pain. The study is not congruent with Nasser (2005), who revealed no apparent significant relation between the patients' knowledge and pain relief. This finding may be explained by the ineffective or unclear educational program, which made his patients not adhere to the treatment regimen and frequent reporting pain and hospitalization.

## 7. Conclusion

The study results revealed that the educational program was effective, and its results had a significant improvement on patient's knowledge, practice, satisfaction, and outcomes regarding lumbar disk herniation.

## 8. Recommendations

- Further research is necessary to measure long-term adherence to the therapeutic exercises among herniated lumbar disc patients.
- The study suggested equips the orthopedic department with a simple illustrated guidelines protocol covering lumbar disc herniation practices and knowledge.
- Reapply this research on a more substantial probability sample acquired from different geographical areas in Egypt for generalization.

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