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Effect of Lumbar Flexion Exercise Program on Pain and Disability among Patients with Chronic Low Back Pain

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Abstract:

Background: Low back pain is one of the most common musculoskeletal disorders patients' complaint, they have disability and negative effects on their activity of daily livings. Back exercise can improve back extension strength, mobility, endurance, and functional ability. **The aim of the study:** this study aimed to evaluate the effectiveness of lumbar flexion exercise program on pain and disability among patients with chronic low back pain. **Research design:** Quasi experimental research design was used to conduct the aim of this study. **Setting:** The study was conducted in the spine and neurosurgery out-patient clinics affiliated to Benha University Hospital, Egypt. **Subjects:** A purposive sample of (100) adult patients with low back pain were taken from both sexes , their age ranged from 51 to 60 years old during six months . **Tools:** four tools were used; (1) Patients' structured interviewing questionnaire , it involved the patients socio demographic characteristics, medical history and physical daily activity (2) Patients' pain assessment, it involved the numeric pain rating scale and subjective expressed pain (3) Oswestry disability index (4)Body mass index. **Results:** the result of this study revealed that, the total mean score regarding pain intensity and disability was (7.48±1.77 and 25.14 ± 5.15) pre exercise intervention and declined in on 2^{nd} and 4^{th} week post exercise program intervention to (4.47±1.08and15.66 ± 3.78) and (1.20±0.79 and 8.20 ± 4.04), respectively. with high significant differences (p= <0.001*). **Conclusion:** The degree of pain and disability among patients with low back significantly improved post exercise program intervention, as well as improved their daily physical activity . **Recommendations:** Ongoing educational and training programs are needed for patients with low back pain and providing patient's necessary instructions about modify their daily activities in the neurosurgery department at Benha University Hospital using booklets.

Key words: Disability, Low back pain, Lumbar flexion exercise, pain, Patients' program

Introduction

Low back pain is defined as pain and discomfort in the lower back area below the costal margin and above the inferior gluteal folds, with or without sciatica .Pain can vary from a dull constant ache to a sudden sharp feeling and occur in all ages and found among both developed and developing nations, low back pain affects men and women equally, but men are at a greater risk of work-related back pain. The onset of LBP for the first time in adults most commonly occurs between 30 and 50 years of age ***(Żywień, Barczyk-Pawelec & Sipko, 2022).***

Low back pain cause disability and consider from common reason for work absenteeism, lost productivity and care- seeking resulting in high annual medical expenditure. According to the 2019 Global Burden of Disease (GBD) study, LBP is currently the sixth highest burden on a list of 291 conditions and is the cause of more years lived with disability globally than any other disease, despite its high prevalence, low back pain has a generally good prognosis ***(Ahmed et al.,2021).***

Low back pain can be classified by the underlying cause as either mechanical , non-mechanical and psychogenic mechanical low back pain may be specific or nonspecific. About 90% of LBP is considered as nonspecific. Non-specific low back pain (NSLBP) is defined as the pain, muscle tension or stiffness localized below the costal margin and above the inferior gluteal fold of unknown etiology. It does not have pathoanatomical cause, so treatment focuses on reducing pain and its consequence ***(Nieminen, Pyysalo & Kankaanpää, 2021).***

Mechanical pain results from dangerous habits, like poor posture, poorly designed seating, incorrect bending and lifting motion that cause stress and strain on muscles of the backbone, it remains a vital health drawback and a serious explanation for incapacity within the operating age. Non-mechanical pain results from infectious, neoplastic, rheumatologic, endocrinologic, vascular, and gynecologic ***(Praveen, Mallikarjunaswamy& Chandrashekhara, 2022).***

Low back pain can be classified by duration as acute (pain lasting less than 6 weeks), sub-acute (pain lasting 6 to 12 weeks), or chronic (pain lasting more than 12 weeks) , the symptoms of low back pain usually improve within a few weeks from the time they start, with 40–90% of people recovered by six weeks but 4% to 25% of patients become chronic ***(Gianola et al.,2022).***

Non pharmacological approaches are being increasingly advocated as the clinical pathway of care for initial LBP management, regardless of symptoms duration (acute, subacute, and chronic LBP). It recommended before initiation of any prescription medication such as back exercise that can improve back extension strength, mobility, endurance, and functional ability , that called active stabilization***(Goertz,2021).***

William's flexion exercises is also called lumbar flexion exercises .It designed to reduce back pain by strengthening the muscles that reflect the lumbosacral spine, especially the abdominal and maximal gluteus muscles, decrease posterior elements on the lumbar spine and stretching the extensor muscle groups , the principle of exercise is to repair body posture, reduce lumbal hyperlordosis , decreases muscle spasms through relaxing effects, avoids stiff intervertebral joints, and checks the lousy posture***(Amila, Syapitri & Sembiring, 2021).***

Significance of the study

Low back pain (LBP) is one of the most frequently encountered complaints in clinical setting, and is the most common type of chronic musculoskeletal pain ,the worldwide point prevalence of low back pain (acute, sub-acute and chronic) was 7.83% (95% CI 7.04 to 8.64) in2017, with 577 million people affected at any one time. In 2017, low back pain was responsible for around 65 million years lived with disability***(Sakai et al.,2022).*** In Egypt, low back pain affects 60% of the population ***(Youssef, Mohammed & Fathy, 2020).*** The number of patients with lower back pain at Benha University Hospital in the last three years (2018, 2019, 2020) was approximate,105,93,100 patients, respectively **(Benha University Hospital Statistical Office, 2020).**

Aim of the study

This study aimed to evaluate the effect of lumbar flexion exercise program on pain and disability among patients with chronic low back pain.

Research Hypothesis:

H1- The degree of pain and disability among patients with low back pain will be significantly reduced after implementing a lumbar flexion exercise program than before.

H2- the pain intensity score of low back pain will be reduced after implementing a lumbar flexion exercise program than before.

H3- There will be a significant relation between pain and disability, pain intensity, and body mass index BMI and demographic characteristics

before and after implementing lumbar flexion exercise program.

II. Subjects and Method

Design: Quasi-experimental design study was used to conduct the study.

Settings: The study was conducted in two settings; spine and neurosurgery out-patient clinics at Benha University Hospital, Qalyubia Governorate, Egypt.

Subjects: A purposive sample of (100) adult patients with low back pain from the setting mentioned above was recruited within 6 months ago. The sample size was calculated based on the previous year's census reported admission in the supine and neurosurgery clinics at Benha University Hospital (Benha University admission office census 2020).

Utilizing the following formula (Yamane, 1967).

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

Where:

n= sample size (100).

N= total population (132).

e= margin error (0.05).

Tools for data collection:

Tool I: Structured interviewing questionnaire; This tool was designed by the researcher and translated into Arabic language after reviewing recent relevant literatures and scientific references. It was adapted from (***Chatterjee ,2018)*** **.**It involved the following three parts as the following:

First part: It concerned with patients' demographic characteristics: This part concerned with the assessment of patients' personal data related to their age, sex, occupation, educational level, residence, marital status of the patients, as well as smoking history.

Second part: patients' medical history, this part designed to assess patients' past and current medical history. It composed of six questions related to patients' history as associated disorder, problem with the lumbar vertebrae, current medical diagnosis, current medical examinations, prescribed management regimen, frequency of treatment regimen.

Third part: patients' physical daily activity assessment:

It aimed to assess patients' physical daily activity pattern in their everyday life. It was developed by the researcher through review of related literature adapted from ***(Rudolf, 2020& Elma et al., 2020)*** and it consisted of 13 items divided into (2) sections as follows:

Section 1: It concerned with physical daily activities in and around the house, concerned with daily activity in and around the house, it included (7) questions about prepare meals, clean kitchen after eating, shopping, praying, sleeping in any position, bathing and dressing.

Section 2: It concerned with travelling and recreational activities, it included (6) questions about walking or using transportation for at least 10 minutes, go up and down stairs, get up and down from car easily, navigation between public transportation, get up and down from bed or chair and practice violent sports for at least 10 minutes.

Tool II: Patients' pain assessment (pre/post program intervention): It was adapted from ***(Chiarotto al., 2019)*** to evaluate the low back pain. It aimed to assess patients' pain intensity and subjective expressed pain characteristics. It involved the following two parts as the following:

Part 1: The Numeric Pain Rating Scale: It aimed to assess the intensity of pain levels. It is an instrument which reflects the intensity of patients' pain, consisting of a 10 cm straight line, with 11-point ranges from '0' representing (no pain) to '10' representing (worst pain imaginable).

Scoring system for numeric pain rating scale:

The values on the pain scale correspond to the pain levels as follows:

- 0 was considered "no pain".
- 1-3 was considered "mild pain".
- 4-6 was considered "moderate pain".
- 7-10 was considered "severe pain".

Part 2: Subjective expressed pain characteristics: It aimed to assess the patients' experience of pain characteristics according to the their description, it included (7) questions as follow: frequency, and kind of pain, most painful time , pattern, waking up at night, pain affecting on concentration and patients' behavior to relieve pain. The studied patients were answered by select the proper characteristics according to their experienced to pain.

Tool III: The Oswestry Disability Index (ODI) (pre/post program intrvention) : It was adapted from **(*Binaya et al., 2021)*** to assess patients' for pain and disability, This instrument has been designed to give information as to how back or leg pain is affecting the patients' ability to manage in everyday life, **it consisted of** ten questions about pain intensity, lifting, personal care (washing& dressing), walking, sitting, social life ,sex life, standing , sleeping, travelling).

Scoring system:

- **The total possible score is 5** . Each question had six choices was ranged from

0-5 scores, first statement was scored (zero) and last statement score was scored (5). **If all 10 sections are completed the score which calculated for total scores 50.**

- The highest score (5) for the worst disabilities and the lowest score (0) for no disability. The values on the disability scale correspond to the disability levels as follows:
- 0 was considered "no disability.
- 1-2 (%50) was considered "mild disability.
- 3- 4 (%75)was considered "moderate disability.
- 4- 5 (%100) was considered "severe disability ".

Tool IV: Anthropometric Measures Assessment: It aimed to assess the nutritional status and confirmed to the study according to inclusion criteria . It was developed by **World Health Organization (2017) criteria**. This part included body height (cm) and weight (kg.). The body mass index (BMI) was calculated with weight divided by the height squared ((kg)/ (m2). The body mass index was categorized into four levels:

- Underweight (BMI < 18.5), (Excluded from the study)
- Ideal weight (18.5 ≤ BMI < 24.0),
- Overweight (24.0 ≤ BMI < 30) and
- Obese (BMI ≥ 30). (Excluded from the study)

Exercises program booklet:

The booklet was designed by the researcher under the guidance of the supervisors after reviewing the recent literatures related to the study and adapted from ***Shareef, 2021.*** It written in simple Arabic language with different illustrated colored pictures that included all theoretical and practical content to improve learning ability of the patients, increase their knowledge level concerning low back pain and lumbar flexion exercise. The booklet covered all information related to low back pain lumbar flexion exercise .It divided into two parts as follows:

Part I: The theoretical part; it aimed to improve patients' knowledge related to low back pain (definition, signs & symptoms, causes, risk factors , diagnosing and how to reduce back pain.

Part II: The practical part; it aimed to improve patients' knowledge and practices of lumbar flexion exercise techniques as (definition, purpose, types, duration, how to perform of lumbar flexion exercise, contraindication, In addition to, how performing of lumbar flexion exercise, and its steps and follow up instruction).

Ethical considerations:

The research approval was obtained from the ethical committee in the faculty of nursing before starting the study, the researcher clarified the objectives and aim of the study to patients' included in the study and assured maintaining anonymity and confidentiality of subjects and patients' were informed that they are allowed to choose to participate or not in the study and they have the right to withdraw from the study at any time without any consequences, verbal consent was obtained from each participants enrolled into the study and all information were gathered used only for their benefit of data and for the purpose of the study.

II. Preparatory phase: This phase included reviewing of literature of various aspects for this study in order to develop the appropriate tools for data collection according to supervisors' guidance and experts' opinions. The researcher translated the lumbar flexion exercise program in Arabic language. During this phase, the researcher also visited the study setting to be acquainted with the personnel and the setting.

Content validity:

The face and content validity were ascertained by a group of (5) experts, five assistant professors from medical surgical nursing department, faculty of nursing , Benha University . The experts reviewed the tools to check the relevancy, simplicity, clarity, comprehensiveness, and applicability of the questions. Their opinions elicited regarding the content, format, consistency, accuracy and relevancy of the tools, necessary modification were done accordingly and the final form of the tools was used for data collection.

Tools reliability:

All tools of the study were tested statistically for its reliability, and it was evaluated using test-retest method by the Cronbach's alpha test which is used to measure the internal consistency. The reliability score of physical activity and habitual feeding pattern **tool I (part III))** was r coefficient (r= 0.766) and was (r=0.885) for patients' oswestry impairment index **tool III** for which denotes the high internal consistency of the used tools.

Pilot study:

Pilot study was conducted on 10 % of studied sample (10 patients) in order to test the

clarity and applicability of the study tools and the program, also to estimate the time required for each tool to be filled by the researcher as well as to identify any possible obstacles that may hinder data collection. Based on the results of the pilot study the necessary modifications were done for more applicable tools to collect data. The patients selected for the pilot study were excluded from the study subjects.

III. Field of work:

Data collection of the study was carried out through six months, from the beginning of January, 2022 at the end of Jun, 2022, the researcher attended the setting three days (Saturday, Tuesday and Thursday) per week. The precautionary practice measures for infection control due to the spread of the Corona virus were taken as maintaining physical distance, wearing facemask, gloves and using alcohol aseptic solution for both the researcher and the patients included in the study. The study was conducted through four phases:

Assessment phase (baseline data) : once the aim of the study was explained to the participant of patients in simple words, each participant was individually interviewed using the structured questionnaire concerning socio demographics, and medical history assessment **(tool I)** as well as the researcher weighed each patient and measured their height to estimate their body mass index using **(tool IV)**. Weight was measured in kilograms using a weight scale. Patients were advised to wear light clothes and were weight without shoes, and it was recorded to the nearest 0.5 kilograms. The patient's height was measured in centimeters (cm) by using a measuring tape. Measurement was done while the patient was standing without shoes, with the heels, shoulders, and back in contact with an upright wall and the head in a horizontal position. Height was recorded to the nearest 0.5 cm. Body Mass Index (BMI) = weight (kg) / height (m) 2. The body mass index was categorized into four levels: underweight (BMI < 18.5), (excluded from the study), ideal weight (18.5 ≤ BMI < 24.0), overweight (24.0 ≤ BMI < 30) and obese (BMI ≥ 30). (excluded from the study). In addition, the patients were asked about their physical daily activity patterns and pain intensity level, and pain with disabilities regarding activities of daily living using **(Tool II, III)** as a baseline data assessment pre-lumber flexion exercise implementation.

Planning phase: Once the initial assessment finished, an evidence-based nursing program was designed based on individual patients' teaching needs. The researcher set up teaching plan covering general and specific objectives. This program was developed from recent literatures, revised and modified based on the experts' comments, in order to be implemented using various methods. The program resources and facilities were allocated (printed material and location or site of session that best serve the learner). The researcher determined the timetable of sessions with the patients for starting program sessions.

The implementation phase (The program intervention): In this phase the researcher implemented the patients' program sessions in the form of two sessions. The duration of each session was take time from 30 to 45 minutes for 3 or 4 patients included in each session. The researcher was available 2 days per week in neurosurgery clinic and 1 day in spine clinic in the morning at Benha University Hospital. Motivation, problem solving and reinforcement techniques were used to enhance active participation of the patient in the educational sessions.

Evaluation phase: It aimed to evaluate an effect of nursing intervention program on the patients' knowledge and behavior regarding low back pain prevention and lumbar flexion exercise. It was based on the finding of differences between pre and post implementation of the performing program. The evaluation was done by the researchers for the patients post 2nd and 4th weeks post lumbar flexion exercise implementation to evaluate the changes in their physical daily activity pattern **(tool I Part 3)**, pain intensity and pain with disability during activities of daily living **(using tool II & tool III).**

Results

Table (1): Illustrates the socio-demographic characteristics of the studied patients. It revealed that most (90.0%) of patients were married nearly one-third of them (36.0%) were aged between 50 - < 60 years, with a mean age of 39.98 ± 12.87 , most (90.0%) of them were married. Concerning the studied patients' sex, 60.0% were females, and 40.0% of them were housewife ,although their educational level was university education at 42.0%. Additionally, they were living in rural areas more than two-thirds of the studied patients (68.0%). On the other hand, 88.0 % of the patients were not smoke.

Table (2): Shows frequency distribution of the studied patients related to their past and current medical history. It revealed that the majority (78.0%) of the studied patients had no

associated disorder. About more than two -third (68.0%) of the studied patients had problems with the lumbar vertebrae. Additionally most (92.0%) of the studied patients had lumbar cartilage slippage. On the other hand, two third (66. 0%) of them made (MRI) scans. In addition, (36.0%) were taking pain-relieving drugs and nearly half (52.0%) of them were taking treatment when necessary and feel pain .

Table (3): Represents BMI of the studied patients (n= 100). It revealed that the mean score of the studied patients' weight and height were (64.84 ± 5.89 and 164.5 ± 6.60), respectively and their total mean body mass index was (23.97 ± 1.68) which (78. 0%) of them had ideal weight (<18.5-<24) and (22.0%) of them had overweight (24-<30).

Table (4): Shows mean and standard deviation of the studied patient regarding physical activity pre and post lumbar flexion exercise program implementation. It revealed that, the highest mean score pre exercise intervention was concerning patients travelling and recreational activities) 35.33 ± 15.03), but, the lowest mean score regarding the daily physical activity (33.43 ± 14.74) pre exercise intervention . On the other hand, the mean scores of the patients travelling and recreational activities was increased on 2nd and 4th week post exercise intervention to (62.50 ± 15.82 and76.33 ± 16.27), respectively. Similarity the mean scores of their physical activity which increased on 2nd and 4th week post exercise intervention to(55.86 ± 13.75 and 73.0 ± 15.94) , respectively. With high statistically significant improvement pre and post lumbar flexion exercise program implementation.

Figure (1): illustrates that, the highest mean% score pre exercise intervention about travelling and recreational activities was 35.33% and was increased on 2nd week and 4th week post exercise intervention to 62.5% and 76.3% , respectively. On the other hand the lowest mean% score pre exercise intervention about daily physical activity was 33.43% and was increased on 2nd week and 4th week post exercise intervention to 55.86% and 73.0%, respectively.

Table (5): This table shows that nearly three quarters (72.0%) of the studied patients had severe pain pre exercise intervention, but on 2nd week and 4th week post exercise intervention (80.0%and 94.0%) of the studied patients had moderate and mild pain , respectively. Moreover, there were high statistical significant improvement regarding the patients' total pain score pre and post lumbar flexion exercise program implementation (p= <0.001*).

Table (6) Shows that, there was high statistical significant improvement concerning the subjective expressed pain characteristics among the studied patients pre and post lumbar flexion exercise program implementation (p= <0.001*). Concerning frequency of pain, it was continuous among (90%) of the studied patients pre exercise intervention, but it changed to intermittent in (54.0% and 14.0%) on 2nd week and 4th week post exercise intervention, respectively. In respect to kind of pain, it was stabbing feeling pre exercise intervention among (60.0%) of them and it changed to be heaviness in (84.0% and 76.0%) on 2nd week and 4th week post exercise intervention, respectively. Also, it was noticed that (54.0%) of the studied patients feeling pain at morning when waking up pre exercise intervention and decline to (24.0%, and 5.0%) on 2nd and 4th week post exercise intervention, respectively.

Figure (2) illustrates that, the highest mean score pre exercise intervention about severity of the pain was 3.52 and decline on 2nd and 4th week post exercise intervention to 2.1 and 1.12, respectively. On the other hand the lowest mean% score pre exercise intervention about sex life was 1.80 and decline on 2nd week and 4th week post exercise intervention to1.15 and 0.68, respectively.

Table (7) Shows that, there was a significant positive correlation between pain intensity score and oswestry disability index score (0.424*) ,(<0.001*) Also, there was significant positive correlation between BMI and oswestry disability index score(0.203*) ,(0.043*) post exercise intervention.

Table 1: Frequency distribution of chronic low back pain studied patients according to their socio demographic characteristics (n =100)

The patient's socio demographic data	Total (n = 100)	
	No.	**%**
Age (Years)		
• 20 – <30	34	34.0
• 30 – <40	24	24.0
• 40 – <50	6	6.0
• 50 – <60	**36**	**36.0**
Mean ± SD	**39.98 ± 12.87**	
Sex		
• Male	40	40.0
• Female	**60**	**60.0**
Occupation		
• Manual work	24	24.0
• Clerical works	32	32.0
• Retired	4	4.0
• Housewife	40	40.0
Level of education		
• Illiteracy	18	18.0
• Reads and writes	10	10.0
• Intermediate education	30	30.0
• University education	**42**	**42.0**
Residence		
• Rural	**68**	**68.0**
• Urban	32	32.0
Marital status		
• Married	**90**	**90.0**
• Single	2	2.0
• Widow	8	8.0
Smoking		
• Smoker	12	12.0
• Non smoker	**88**	**88.0**

Table (2): Frequency distribution of chronic low back pain studied patients according to their medical history. (n =100)

Past and current patient history	Total (n = 100)	
	No.	%
Associated disorder:-		
• None	**78**	**78.0**
• Hypertension	12	12.0
• Diabetes	8	8.0
• Heart disorders	2	2.0
Problem with the lumbar vertebrae:-		
• Yes	**68**	**68.0**
• No	32	32.0
Current medical diagnosis		
• lumbar cartilage slippage	**92**	**92.0**
• Arthritis	4	4.0
• Osteoporosis	4	4.0
Current medical examinations		
• Plain x-ray rays	24	24.0
• (CT) scan	6	6.0
• (MRI) scan	**66**	**66.0**
• No	4	4.0
Prescribed management regimen:-		
• None	12	12.0
• Pain-relieving drugs	**36**	**36.0**
• Warm compresses	24	24.0
• Physiotherapy	28	28.0
Frequency of treatment regimen		
• Constantly	14	14.0
• Sometimes	34	34.0
• If necessary and feel pain	**52**	**52.0**

Table (3): Mean scores and standard deviation regarding BMI of chronic low back pain studied patients. (n = 100)

BMI	Total (n = 100)	
Weight (kg)		
Mean ± SD.	64.84 ± 5.89	
Height		
Mean ± SD.	164.5 ± 6.60	
BMI (Kg/m^2)	**No.**	**%**
• Normal (<18.5-<25)	78	78.0
• Overweight (25-<30)	22	22.0
Mean ± SD.	23.97 ± 1.68	

Table (4) : Mean score , standard deviation and significant difference of the studied patient regarding physical activity pre and post lumbar flexion exercise program implementation (n = 100)

Physical activity	Pre test	Post test		Fr.	p
		2 weeks	4 weeks		
The daily physical activity					
Total Score					
Min. –Max.	0.0 – 8.0	2.0 – 12.0	5.0 – 14.0		
Mean ± SD.	4.68 ± 2.06	7.82 ± 1.92	10.22 ± 2.23	187.149*	<0.001*
Mean % Score	**33.43 ± 14.74**	**55.86 ± 13.75**	**73.0 ± 15.94**		
Travelling and recreational Activities					
Total Score					
Min. –Max.	0.0 – 9.0	3.0 – 12.0	4.0 – 12.0		
Mean ± SD.	4.24 ± 1.80	7.50 ± 1.90	9.16 ± 1.95	184.344*	<0.001*
Mean % Score	**35.33 ± 15.03**	**62.50 ± 15.82**	**76.33 ± 16.27**		
Overall					
Total Score					
Min. –Max.	12.0 – 29.0	18.0 – 38.0	28.0 – 44.0		
Mean ± SD.	19.78 ± 4.13	29.88 ± 3.99	36.40 ± 4.32	195.385*	<0.001*
Mean % Score	**43.0 ± 8.97**	**64.96 ± 8.67**	**79.13 ± 9.38**		

SD: **Standard deviation** **Fr.: Friedman test**
p: p value for comparing between the studied periods
*: Statistically significant at $p \leq 0.05$

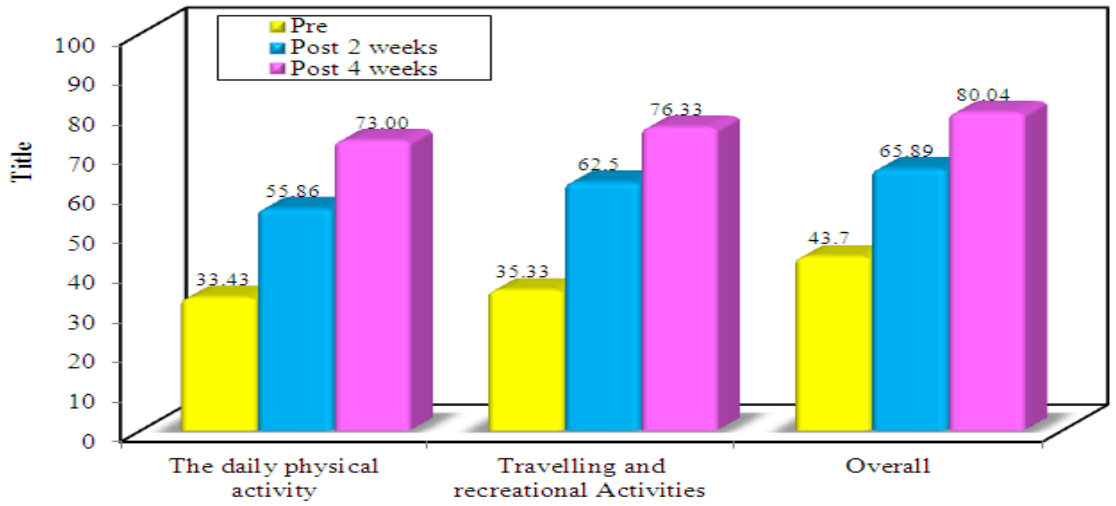

Figure (1): Mean percent score and standard deviation regarding physical activity and travelling and recreational activities of studied patients pre and post lumbar flexion exercise program implementation.

Table (5): Frequency distribution and significant difference of the studied patients regarding to their pain intensity score pre and post lumbar flexion exercise program implementation (n=100)

Pain intensity score	Pre test		Post test				Fr	p
			2 weeks		4 weeks			
	No.	%	No.	%	No.	%		
No pain (0)	0	0.0	0	0.0	2	2.0	185.795*	<0.001*
Mild pain(1-3)	0	0.0	20	20.0	**94**	**94.0**		
Moderate pain(4-6)	28	28.0	**80**	**80.0**	4	4.0		
Sever pain(7-10)	**72**	**72.0**	0	0.0	0	0.0		
Mean ± SD	**7.48±1.77**		**4.47±1.08**		**1.20±0.79**			

Table (6): Frequency distribution and significant difference of the studied patients according to their subjective expressed pain characteristics pre and post lumbar flexion exercise program implementation (n=100)

Subjective expressed pain characteristics		Pre test		Post test				p
				2 weeks		4 weeks		
		No.	%	No.	%	No.	%	
Frequency	• Continuous	90	90.0	54	54.0	14	14.0	<0.001*
	• Intermittent	10	10.0	26	26.0	6	6.0	
	• Heavy activity	0	0.0	20	20.0	80	80.0	
Kind	• Burning	10	10.0	4	4.0	6	6.0	<0.001*
	• Stabbing	60	60.0	10	10.0	14	14.0	
	• Numbness	6	6.0	2	2.0	4	4.0	
	• Heaviness	24	24.0	84	84.0	76	76.0	
Most painful time	• Morning when waking up and doing from bed	54	54.0	24	24.0	5	5.0	<0.001*
	• Night when lying in bed	14	14.0	10	10.0	8	8.0	
	• When turning right and left	7	7.0	4	4.0	4	4	
	• When standing long	20	20.0	42	42.0	13	13	
	• After carrying heavy objects	5	5.0	20	20.0	70	70.0	
Pattern	• Suddenly	58	58.0	12	12	8	8.0	<0.001*
	• Gradually	42	42.0	88	88.0	92	92.0	
Waking up at night	• Always	32	32.0	8	8.0	2	2.0	<0.001*
	• Sometimes	64	64.0	30	30.0	4	4.0	
	• Never	0	0.0	32	32.0	46	46.0	
	• Can be tolerated while sleeping and I do not wake up	4	4.0	30	30.0	48	48.0	
Pain affecting on concentration	• Unable to concentrate completely	32	32.0	0	0.0	2	2.0	<0.001*
	• To some extent able to focus	0	0.0	78	78.0	16	16.0	
	• Able to focus completely	26	26.0	14	14.0	82	82.0	
	• Blurred focus	42	42.0	8	8.0	0	0.0	
Behavior to relieve pain	• Taking analgesic	34	34.0	14	14.0	10	10.0	<0.001*
	• Lying down	36	36.0	2	2.0	4	4.0	
	• Making hot compresses	30	30.0	24	24.0	16	16.0	
	• Practicing exercise	0	0.0	60	60.0	70	70.0	

Fr: **Friedman test**, Sig. bet. Periods was done using **Post Hoc Test** (**Dunn's)**
p: p value for comparing between the studied periods *: Statistically significant at $p \leq 0.05$

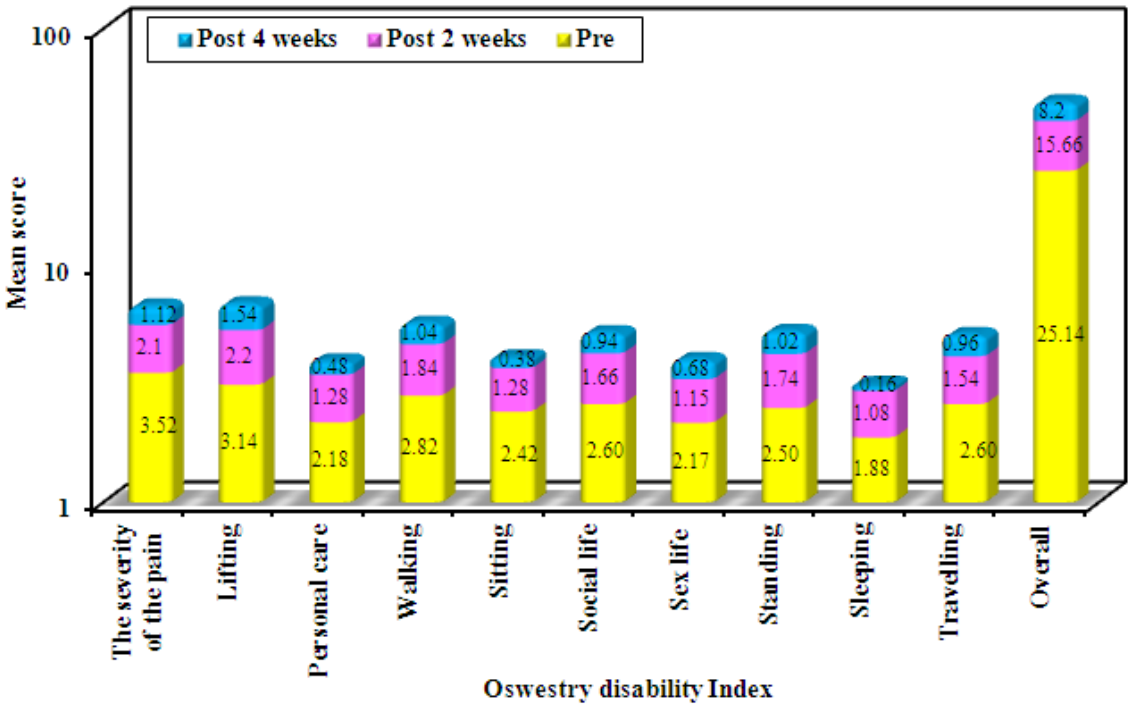

Figure (2): Mean score, standard deviation and significant difference of the studied patients regarding to oswestry disability index score pre and post lumbar flexion exercise program implementation (n = 100)

Table (7): Correlation between oswestry disability index score, pain intensity score and BMI with subjective expressed pain characteristics post lumbar flexion exercise program implementation (n = 100)

Subjective expressed pain characteristics		Oswestry impairment index score	Pain intensity score	BMI
Oswestry Impairment Index score	**r**			
	p			
Pain intensity score	**r**	0.424*		
	p	<0.001*		
BMI	**r**	0.203*	0.049	
	p	0.043*	0.627	

r_s: Spearman coefficient

*: Statistically significant at $p \leq 0.05$

Discussion

Lumbar flexion exercises is the main interventions used to regain function, strengthen and stabilize the spine, so this study aimed to evaluate the effect of lumbar flexion exercise program on pain and disability among patients with chronic low back pain.

The results of the present study revealed that more than one thirds of studied patients were recorded within age group of fifty to less than sixty years old. .This result in the same line with ***Eromon et al., (2020)*** about " Prevalence of Low Back Pain Among Adult Patients Attending Family Medicine Clinics " ,it showed that the age of most of the studied patients was recorded between fifty to less than sixty years.

As regard to sex, the current study results showed that three fifth of the studied patients were female. This finding is in line with a study by ***Monticone et al., (2020).*** And stated by a study about "The Italian version of the Quebec Back Pain Disability Scale: cross-cultural adaptation, reliability and validity in patients with chronic low back pain" showed that the majority of the studied patients were female.

Concerning their occupation, the results of the current study revealed that two fifth of the studied patients were housewife. This result is in agreement with a study by ***Saxena, & Sankaralal, (2021)***which titled" Evaluation of causes and preventive measures of low back pain " and reported that the majority of studied groups were housewife .

As regard to educational level, the current study showed that approximately two fifth of the studied patients had university education. Similarly, ***Alnaami, et al., (2019)*** about " Prevalence and factors associated with low back pain among health care workers in southwestern Saudi Arabia " it showed that the majority of studied patients had university education.

As regards to residence, the current study findings revealed that more than two third of the studied patients lived in rural areas. This finding is consistent with a study was done by ***Husky et al., (2018)*** about " Chronic back pain and its association with quality of life in a large French population survey" they mentioned that the majority of the studied groups were from rural areas.

Concerning their marital status, the result revealed that most of the studied patients were married. It may attributed to that the Egyptian females prefer to be married in young age according to Egyptian society culture .This finding is in line with a study supported by ***Mijena et al.,(2020***) about " Low back pain among nurses working at public hospitals in eastern Ethiopia" that the majority of the studied groups were married.

Concerning smoking, the current study revealed that the majority studied patients were nonsmokers.This result is agreement with ***Ferrari et al., (2019).*** about " Is there a relationship between self-efficacy, disability, pain and socio demographic characteristics in chronic low back pain? " and stated that the highest percentage of the studied patients were nonsmokers.

Concerning associated disorder, the current study results showed that nearly three quarters of the studied patients had no associated disorder. This finding is consistent with a study was done by ***Sharaf et al., (2020)*** and reported that most of the studied patients had no associated disorder. This finding is incongruent with a study conducted by ***Jimenez-Garcia et al., (2018)*** about " Is there an association between diabetes and neck pain and lower back pain? Results of a population-based study" they stated that diabetes was the most associated physical disorder that reported in less than half of the studied patients.

Regarding complaints from problem with lumbar vertebrae, the findings of the current study revealed that more than two thirds of the studied patients had problem with the lumbar vertebrae. This finding is agree with a study was done by ***Tatsumi et al., (2019)*** about " Risk factors of low back pain and the relationship with sagittal vertebral alignment in Tanzania" reported that the majority of the studied patients had problem in the lumbar vertebrae .

Regarding current medical diagnosis , the findings of the current study revealed that most of the studied patients had lumbar cartilage slippage. This finding is supported by ***Zhang et al., (2019)*** in a study about "Low back pain in emergency ambulance workers in tertiary hospitals in China and its risk factors among ambulance nurses" stated that majority of the studied patients were had low back pain and diagnosed with lumbar cartilage slippage due to frequent bending of the trunk, heavy and awkward lifting.

As regards current medical examinations performed , the present study revealed that two third of the studied patients were made (MRI) scan. This finding also supported with a study by ***Rahyussalim et al., (2020)*** about " Significance of the association between disc degeneration changes on imaging and low back pain" and showed that most of the studied patients were diagnosis by (MRI) scan.

Considering prescribed treatment regimen , it noticed that more than one third of the studied patients had been taken pain relieving drugs .This finding supported with a study by ***Bagg et al., (2018)*** about " Paracetamol, NSAIDS and opioid analgesics for chronic low back pain" and stated that the highest percentage of the studied patients had been taken analgesics to control low back pain.

Regarding frequency of treatment regimen , the current study revealed that more than half of the studied patients had medication when feel pain. This finding is supported with a study by ***Chou et al., (2018)*** about " Patients' perceived needs for medical services for non-specific low back pain" and stated that the most of studied patients had been taken the medication if strictly necessary and when feel pain.

As regards the body mass index , the current study revealed that, nearly three quarters of studied sample had ideal weight and the average of all patients on border line between ideal weight and obesity . It was in harmony with a study was conducted ***Sukmajaya et al., (2021)*** about "Williams flexion exercise for low back pain: A possible implementation in rural areas" and showed that the highest percentage of the studied patients were classified as ideal weight.

Concerning patients' physical activity pre and post lumbar flexion exercise program implementation, there were a high statistically significant improvement as regards daily physical activity, travelling and recreational activities compared with pre exercise intervention This result is also, agree with a study was done by ***Yundari & Mas, (2018)*** about" Effectiveness Of William Flexion Exercise To Reduce Pain Intensity On Low Back Pain (LBP) Of Woodcarvers In Bali, Indonesia" showed that there was significant reduce the pain intensity and improvement functional activity among the studied patients.

Concerning patients' pain intensity, the current results revealed that, there were high statistically significant differences regarding the patients' total pain score pre and post lumbar flexion exercise program implementation. This finding is in the same line with a study conducted by ***Shareef, (2021)*** who revealed that there were high significant improvement with decreasing the pain among the studied patients . Also, the finding of the current study are consistent with ***Ahmed Ali et al., (2022)*** who conducted a research about " Effect of Implementing Exercise Program on Pain and Physical Functions among Patients with Moderate Knee Osteoarthritis" and reported that the intensity of pain symptoms ,there was statistically and clinically significant improvements in level of the studied patients pain after exercise program implementation ,it may be due to the dynamic effect of exercise influence.

Regarding patients' subjective expressed pain characteristics, the current study showed that there were high statistically significant differences improvement in the patients' expressed pain characteristics post lumbar flexion exercise program implementation compared with pre exercise intervention . This finding is in agreement with a study conducted by ***Pandya & Shukla , (2021)*** titled " Effect of Lumbar Stabilization Exercises on Stable versus Unstable Surface on Pain and Function in Mechanical Low Back Pain - An Evidence Based Study" stated that there were high statistically significant differences improvement in the subject expressed pain characteristics among the studied patients post exercise intervention.

Concerning mean score of the studied patients' regarding oswestry disability index score pre and post lumbar flexion exercise program implementation, the finding of the present study revealed that there were high statistically significant differences in the mean score of the studied patients' disability pre and post exercise intervention. This result is supported by the findings of a study conducted by ***Sharaf et al., (2020)*** about " Effects of Educational Nursing Interventions on Pain, and Quality of Life among Nurses with Low Back Pain" they asserted that there were high statistically significant differences regarding the mean score of the studied patients' disability pre and post education intervention.

Pertaining to correlation between pain intensity score and oswestry impairment index score, it showed that there was a significant positive correlation between pain intensity score and oswestry impairment index score post lumbar flexion exercise program implementation .Contrarily with this finding a study was done by ***Hong & Shin, (2020)*** titled " Relationship between pain intensity, disability, exercise time and computer usage time and depression in office workers with non-specific chronic low back pain" , they asserted that there was a correlation between the oswestry disability index and the numeric pain rating scale.

The finding of the present study also showed that there was significant positive correlation between BMI and oswestry impairment index score post lumbar flexion exercise program

implementation. The result is in the same line with study by ***Bayartai et al., (2022)*** about " Changes in the Oswestry Disability Index after a 3-Week In-Patient Multidisciplinary Body Weight Reduction Program in Adults with Obesity" they asserted that there were significant positive correlation between BMI and oswestry impairment index score.

Conclusions

According to the findings of this study, it concluded that: the degree of pain and disability among patients with low back pain significantly improved post program implementation which reflects that lumbar flexion exercise was effective in reducing pain intensity , disability and had a positive impact on patients' daily activity performance with high statistically significance differences (p=<0.05), which supported the research hypotheses.

Recommendations

This study was recommended as the following:

- The need for continuous educational and training programs for patients with low back pain.
- The researches should be focus on the patients to maintain their health life style.
- Encouraging patients about using safe handling techniques while at work through special sessions using of posters.
- Activating the educator role of the community health nurse in all health care centers to raise awareness among people about the importance for need early diagnosis, proper treatment and recovery policies to alleviate the burden associated with chronic low back pain.
- Strategies need to be created and applied to deal with modifiable risk factors for disabling low back pain.
- Avoid imaging studies (magnetic resonance imaging, computed tomography, or radiography) for acute low back pain without specific indications.

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