

## Effects of Rehabilitative Exercises and Localized Manipulation on Treating Lumbar Herniated Discs in Non-Active Elderly

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**Abstract:** This research aims to identify the effects of using rehabilitative exercises in old age non-active patient with herniated lumbar discs (group 1), the effects of using rehabilitative exercises and localized manipulation for vertebrae (manual treatment) in old age non-active patient with herniated lumbar discs (group 2) and the effects of using localized manipulation in treating herniated lumbar discs. The researchers used the experimental approach (two-group design) with two experimental groups and pre-/post-measurements. Participants (n=15) were purposefully chosen from patients of physiotherapy hospital -Kuwait. All patient had lumbar discs injuries (left lumbar discs herniation between 4<sup>th</sup> and 5<sup>th</sup> lumbar discs or between 5<sup>th</sup> lumbar disc and 1<sup>st</sup> sacral disc). Patients were divided into two equivalent groups (g 1 = g 2 = 5) as three patients were disqualified and two others were chosen for pilot study. Results indicated that: (1) Localized manipulation and rehabilitative exercises together have positive effects as exercises strengthen working muscles that stabilize lumbar and sacral vertebrae in addition to fixing the injured vertebrae to normal position. (2) Localized manipulation and rehabilitative exercises restored low back range of motion to near normal in addition to restoring muscular strength of working muscles. (3) The recommended rehabilitative exercises program with Localized manipulation improved functional efficiency of the spine to perform its tasks automatically. (4) The recommended rehabilitative exercises program with Localized manipulation encouraged patients to avoid surgeries and depend on such programs for treating herniated lumbar discs.

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**Key words:** Exercises - Localized Manipulation - Lumbar Herniated Discs – Elderly

### 1. Introduction:

Lumbar pain is the most common problem among orthopedic patients. Statistics indicated that four of each five adults suffer severe lumbar pain during their life span. It is considered the second most common medical problem after flu and common cold (Foster 2001: 135).

Herniated discs injuries result from internal or external stimuli like mechanical, thermal, chemical, viral or psychological stimuli. These stimuli may cause the spine to take unnatural move to increase its adaptability to pressures and other factors affecting it (Nadler et al 2002: 776). Lumbar herniated discs result from herniation of lumbar discs because of sudden strain or several other factors like aging, life style or incorrect spinal posture. It may appear directly or may take several weeks or even months to develop (Taimela et al 1999: 265). Lumbar pain usually results from pressure over nervous fibers because lumbar discs came out of the vertebrae. This pressure usually occurs on spinal joints because of pressure over lumbar discs. This creates further pressure over spinal tube and lateral nerves and may lead to inflammation

and pain (Bogduk 2002: 193). Major causes of vertebral problems include direct or indirect trauma, muscular strain for spinal working muscles, aging and osteoporosis. Major symptoms include clear sharp low back pain, burning, stinging and numbing in the buttocks, legs and feet (Nadler et al 2000: 89).

Most spinal injuries are related to health awareness, life style and job stress. Major spinal injuries include spinal curvature, frontal displacement of lumbar discs, herniated discs and vertebrae stiffness (Stramme et al 2004: 743). With aging, water decreases in the core of vertebral discs with increased fibers and decrease of gelatin. This makes the disc more vulnerable to injury as it gets out of its place while moving in different directions (Foster 2001: 149). Herniated discs result from violent sudden moves. These ruptures force open the fibrous capsule surrounding the joint leading the disc core to be forced out and press over the surrounding area including nerves, muscles, ligaments or blood vessels of the back (Burton et al 2007: 202).

Localized manipulation of vertebrae means hand manipulation of the spine and joints. This therapy is

concerned with treatment of musculoskeletal and nervous systems without surgery. It is also called localized return of vertebrae. It includes quick and non-painful moves for correcting the vertebral curvature and its functionality (Koes et al 2002: 860).

Vertebrae manipulative therapy is the since of manual moving practices. It is a medical branch concerned with human health. It studies mechanical relations among different body parts, especially the spine and pelvis, in addition to relations among bones, nerves, muscles and blood vessels (Assendleft 2000: 475). Localized manipulation aims to achieve optimum physiological response of the body through correcting any abnormal relation between different body parts. This makes the body feels more prepared to use its potentials to perform natural functions normally (Twomey & Taylor 2006: 615).

Manual return of vertebrae to its location is done through moving hands and fingers to mellow ligaments and muscles responsible for bone curvature with a calculated force according to anatomical principles so that bones and joints return to normal shape. This is done with movements greater than self-induced movements by patients according to anatomical abilities of bones and ligaments (Fiechtner & Brodeur 2005: 283).

Manual return of vertebrae to its location is done by a therapist using his/her hands or a specially-designed device to correct bone and joint position to normal. This decreases pain and restores balance between musculoskeletal and nervous systems (Assendleft et al 2003: 871). Localized manipulation of vertebrae is a manual or mechanical drag on the spine's axis to decrease pressure over vertebrae or ligaments between them. it works on putting vertebrae in a maximal stress state that exceeds normal movement of joints to guarantee the return of vertebrae to normal position (Shekelle 2004: 858).

This type of therapy depends on manual therapy of the spine without using drugs or surgical operations. It is not used for diagnosis as it depends on the concept that the human body has its own natural healing abilities that stems from the body itself (Nohseni-Bandpei et al 2002: 185).

Low back is an anatomically complex area that links upper and lower bodies together. Its function is to allow us to move, lean, rotate, stand and walk. Any injury in this area may induce a decrease in vitality and activity in addition to the inability of working and losing functional abilities to perform basic daily life tasks. This may last for a long time and hinders patients from work or daily life activities in addition to creating further chronic health problems if not treated quickly (Watkins 2003: 986).

Lower lumbar area is more vulnerable to injuries as it witnesses more anterior and posterior flexions

(Stramme et al 2004: 741). Spinal injuries became more widespread as a concerning phenomenon with several causes, especially in old age because of muscles and cartilages stiffness (Miller et al 1999: 314).

In its report on back pain prevalence in industrial cities, WHO indicated that 80.60% of population are vulnerable to these pains and 11% of them suffer from pain for 3-6 months while 4% suffer from pain for more than 6 months as it becomes a chronic health problem. Back pain is not different between males and females of 45-60 years (Bigos et al 2004: 53). Although there are several methods for diagnosing low back pain, functional tests should be used for identifying the required therapy and its intensity (Delitto 2004: 542).

The researchers noticed several efforts to design therapeutic programs for decreasing low back pain. But unfortunately, they didn't lead to the desired outcomes and more effective therapeutic methods are needed, especially as most surgeons prefer not to proceed into surgical treatment in many cases. The current research aims to identify the effects of using rehabilitative exercises and localized manipulation for vertebrae (manual treatment) in old age non-active patient with herniated lumbar discs.

#### **Aims:**

The current research aims to:

1. Identify the effects of using rehabilitative exercises in old age non-active patient with herniated lumbar discs (group 1).
2. Identify the effects of using rehabilitative exercises and localized manipulation for vertebrae (manual treatment) in old age non-active patient with herniated lumbar discs (group 2).
3. Identify the effects of using localized manipulation in treating herniated lumbar discs.

#### **Hypotheses:**

- There are statistically significant differences between the pre- and post-measurements of group 1 (rehabilitative exercises) in favor of post-measurements.
- There are statistically significant differences between the pre- and post-measurements of group 2 (rehabilitative exercises and localized manipulation) in favor of post-measurements.
- There are statistically significant differences between the post-measurements of group 1 and group 2 in favor of group 2.

#### **2. Methods:**

**Approach:**

The researchers used the experimental approach (two-group design) with two experimental groups and pre-/post-measurements.

**Participants:**

Participants (n=15) were purposefully chosen from patients of physiotherapy hospital -Kuwait. All patient had lumbar discs injuries (left lumbar discs herniation between 4<sup>th</sup> and 5<sup>th</sup> lumbar discs or between 5<sup>th</sup> lumbar disc and 1<sup>st</sup> sacral disc). Patients were divided into two equivalent groups (g 1 = g 2 = 5) as three patients were disqualified and two others were chosen for pilot study. Patients were qualified according to the following criteria:

1. All patients are between 45: 60 years.
2. All patients are diagnosed by their doctors as having herniated lumbar discs (left lumbar discs herniation between 4<sup>th</sup> and 5<sup>th</sup> lumbar discs or between 5<sup>th</sup> lumbar disc and 1<sup>st</sup> sacral disc) as follows:
  - Past history of the patients (symptoms – intensity – previous treatment).
  - Physical examination by specialized doctor to indicate: range of motion – balance disorders – pain

during examination – limp reflexes – muscle weakness – lose of sense – any other signs of spinal problems.

- Diagnostics: these include x-ray to locate herniated discs and other problems like tumors. (Manniche et al 2005: 317; Jensen et al 2002: 267; Frymoyer et al 2002: 681)

3. Pain intensity on pain scale is between 7-10.
4. Thorough medical examination to insure cardiovascular health.
5. Free of other bone diseases (osteoporosis – rheumatoid – rheumatism).
6. All vital systems are health.
7. Free of diabetes and hypertension.
8. Free of obesity or thinness.
9. To be able to perform rehabilitative exercises and commit to therapeutic schedule.

Table (1) indicated that squewness values ranged between ( $\pm 3$ ). This indicates participants' homogeneity.

**Table (1): mean, median, SD and squewness for both groups on basic variables (G1=G2= 5)**

Variables	G1 (Rehabilitative Exercises)				G2 (Rehabilitative Exercises with Localized Manipulation)			
	Mean	Median	SD $\pm$	Squewness	Mean	Median	SD $\pm$	Squewness
Age (year)	50.40	50.00	1.14	0.41	49.40	49.00	2.07	0.24
Height (cm)	167.80	168.00	1.30	-0.54	167.40	167.00	1.14	0.11
Weight (kg)	72.60	73.00	2.07	-0.24	72.60	72.60	1.34	0.17
Pain degree	8.60	9.00	0.55	-0.61	8.60	8.60	0.55	-0.61

Table (2) indicated that U calculated values for all variables were not statistically significant, indicating that the two groups are equivalent. The researcher calculated homogeneity and equivalence of both groups on all research variables as seen in tables (3) and (4).

**Table (2): Mann Whitney U test for Difference Significance among both groups (G1=G2=5)**

Variables	Rank mean		Rank Sum		U	P
	G1	G2	G1	G2		
Age (year)	6.30	4.70	31.50	23.50	8.50	0.42
Height (cm)	6.00	5.00	30.00	25.00	10.00	0.69
Weight (kg)	5.50	5.50	27.50	27.50	12.00	1.00
Pain degree	5.50	5.50	27.50	27.50	12.50	1.00

Table (3) indicated that skewness values ranged between ( $\pm 3$ ). This indicates participants' homogeneity.

**Table (3): mean, median, SD and skewness for both groups on research variables (G1=G2= 5)**

S	Variables	G1 (Rehabilitative Exercises)				G2 (Rehabilitative Exercises with Localized Manipulation)			
		Mean	Median	SD±	Squeness	Mean	Median	SD±	Squeness
1	Trunk right flexion	26.40	26.00	1.14	0.41	26.60	27.00	1.14	-0.41
2	Trunk left flexion	20.80	21.00	0.84	0.51	21.20	21.20	0.84	0.51
3	Trunk forward flexion	66.00	66.00	1.22	1.36	67.20	68.00	1.30	-1.71
4	Trunk backward flexion	20.20	20.00	0.84	-0.51	20.80	21.00	1.30	-0.54
5	Trunk right rotation	56.80	57.00	0.84	0.51	57.20	57.00	0.84	-0.51
6	Trunk left rotation	47.00	47.00	1.00	0.00	47.80	48.00	1.30	-0.51
7	Degree of right thigh flexion to trunk	28.40	28.00	1.14	0.41	28.40	28.00	1.14	0.41
8	Degree of left thigh flexion to trunk	53.40	54.00	1.34	-0.17	50.20	50.00	0.84	-0.51
9	Long sitting for measuring distance between right hand and right leg	17.60	18.00	0.55	-0.61	18.00	18.00	1.22	-1.36
10	Long sitting for measuring distance between left hand and left leg	26.20	26.00	0.84	-0.51	26.80	27.00	1.30	-0.54
11	Right leg height over the ground	26.40	27.00	0.89	-1.26	26.40	26.00	1.14	0.41
12	Left leg height over the ground	17.00	17.00	1.00	0.00	17.40	18.00	0.89	-1.26
13	Lateral right back muscles strength	14.00	14.00	1.00	0.00	14.20	14.00	0.84	-0.51
14	Lateral left back muscles strength	9.00	9.00	1.00	0.00	9.20	9.00	0.44	2.23
15	Back muscles strength from sitting with pulling dynamometer backward	16.00	16.00	1.00	0.00	16.40	17.00	0.89	-1.26
16	Abdominal muscles strength	24.00	24.00	1.00	0.00	24.20	24.00	0.84	-0.51
17	Back muscles strength	40.00	40.00	1.00	0.00	39.20	39.00	1.30	0.54

Table (4) indicated that U calculated values for all variables were not statistically significant, indicating that the two groups are equivalent.

**Table (4): Mann Whitney U test for Difference Significance among both groups (G1=G2=5)**

S	Variables	Rank mean		Rank Sum		U	P
		G1	G2	G1	G2		
1	Trunk right flexion	5.20	5.80	26.00	29.00	11.00	0.84
2	Trunk left flexion	4.80	6.20	24.00	31.00	9.00	0.55
3	Trunk forward flexion	4.30	6.70	21.50	33.50	6.50	0.22
4	Trunk backward flexion	4.70	6.30	23.50	31.50	8.50	0.42
5	Trunk right rotation	4.80	6.20	24.00	31.00	9.00	0.55
6	Trunk left rotation	4.50	6.50	22.50	32.50	7.50	0.31
7	Degree of right thigh flexion to trunk	5.50	5.50	27.50	27.50	12.50	1.00
8	Degree of left thigh flexion to trunk	5.80	5.20	29.00	26.00	11.00	0.54
9	Long sitting for measuring distance between right hand and right leg	4.60	6.40	23.00	32.00	8.00	0.41
10	Long sitting for measuring distance between left hand and left leg	4.70	6.30	23.50	31.50	8.50	0.42
11	Right leg height over the ground	5.60	5.40	28.00	27.00	12.00	1.00
12	Left leg height over the ground	4.90	6.10	24.50	30.50	9.50	0.55
13	Lateral right back muscles strength	5.20	5.80	26.00	29.00	11.00	0.84
14	Lateral left back muscles strength	5.20	5.80	26.00	29.00	11.00	0.84
15	Back muscles strength from sitting with pulling dynamometer backward	4.90	6.10	24.50	30.50	9.500	0.55
16	Abdominal muscles strength	5.20	5.80	26.00	29.00	11.00	0.84
17	Back muscles strength	6.50	4.50	32.50	22.50	7.50	0.31

Data collection instruments:

**Tools:**

A restameter (heights) – a medical balance (weights) – dynamometer – goniometer – measuring tape.

**Measurements:**

- Local examination through a specialized doctor, x-ray and identification of pain degree by the doctor (1-10).

- Visual Analog Scale (VAS): a graded scale (0-10) used by patients to evaluate their sense of pain as (0) means no pain while (10) means max pain (Calliet 1999: 90).

- Standing trunk flexion (right – left).
- Standing trunk flexion (forward – backward).
- Standing trunk rotation (left – right).
- Long sitting with thigh flexion (right – left) to trunk.

- Long sitting with arms forward (measuring distance between right hand and right leg).

- Long sitting with arms forward (measuring distance between left hand and left leg).

- Long sitting for measuring leg height (right – left) from ground.

- Standing for measuring lateral back muscles (right – left).

- Long standing (measuring back muscles strength while pulling a dynamometer backwards). (Hoppenfeld 2003: 512; Deyo 1999: 232; Deyo et al 2003: 441)

**Pilot study:**

The researcher performed the pilot study on (2) patients diagnosed as having left lumbar discs herniation in Physiotherapy Hospital – Kuwait, with a specialized physiotherapist from 1-11-2017 to test the program content and identify repetitions of each exercise during each stage. In addition, the pilot study verified the validity of tools and best methods of localized manipulation. Final versions of measurements, total duration of the program, unit duration, suitable methods and durations for localized manipulation and rest intervals were concluded.

**Therapeutic methods:**

1. Rehabilitative exercises for left lumbar discs herniation according to participants' age. Exercises were applied by a specialized physiotherapist.

2. Localized manipulation using three methods for treating patients. Methods were applied by a specialized physiotherapist.

**The Rehabilitative Exercises Program:**

The program was designed according to review of literature related to rehabilitative exercises and localized manipulation practices used in treating herniated lumbar discs. The program included exercises and methods of manipulation suitable in intensity and duration for participants, in addition to tests and measurements. The program aims to:

1. Improve functional capacity of the spine through eliminating pain.

2. Improve spine range of motion.

3. Improve muscular strength of working muscles.

Final version of the program was applied to participants in Physiotherapy Hospital – Kuwait from 15-11-2017 to 1-4-2018 (12 weeks). The program was applied by a specialized physiotherapist.

**Sample session of rehabilitative exercises (good warmup and stretches are required)**

	Exercise	Load formation			Week 1	
		Reps	Rest	Sets	Reps	Sets
1	(standing) mild walking 25 m	10	30 sec	2	15	3
2	(lying) right leg up with 45 degrees and fix for (15 sec)	10	30 sec	2	15	3
3	(lying) left leg up with 45 degrees and fix for (15 sec)	10	30 sec	2	15	3
4	(lateral Prostration) left leg up and fix for (15 sec)	10	30 sec	2	15	3
5	(lateral Prostration) right leg up and fix for (15 sec)	10	30 sec	2	15	3
6	(Prostration) right leg up and back and fix for (15 sec)	8	30 sec	2	10	3
7	(Prostration) left leg up and back and fix for (15 sec)	8	30 sec	2	10	3
8	(prostration) stretching arms to push the ground and arching	10	30 sec	2	15	3
9	(standing with fixed waist) back arching	15	30 sec	2	15	3
10	(inclined standing with shoulders on the wall) arm stretching with trunk arching	15	30 sec	2	15	3
11	(inclined standing with shoulders on the wall) right leg swing	20	30 sec	2	25	3
12	(inclined standing with shoulders on the wall) left leg swing	20	30 sec	2	25	3



**Procedures:**

1. All participants were gathered in Physiotherapy Hospital – Kuwait.
2. Inclusion criteria were verified for all participants.
3. Age, height and weight were measured and recorded in separate forms for each patient.
4. Physical examination and x-ray were examined to verify the diagnosis (left lumbar discs herniation between 4<sup>th</sup> and 5<sup>th</sup> lumbar discs or between 5<sup>th</sup> lumbar disc and 1<sup>st</sup> sacral disc) in addition to identifying degree of pain.
5. Medical tests were verified to assure all participants are well and free of bone diseases, cardiovascular diseases, diabetes and blood pressure.
6. Pre-measurements were taken for all participants.
7. Participants were divided into two equivalent groups (G1=G2=5).
8. Rehabilitation program was performed for (12) weeks (3 sessions per week) according to participants' age group and functional abilities.
9. Group (1) used rehabilitative exercises only.
10. Group (2) used rehabilitative exercises in addition to localized manipulation (3 techniques for 10 minutes each and 1-minute rest interval between each two techniques) localized manipulation was applied by a specialized physiotherapist under direct supervision of the treating doctor and the two researchers.
11. Localized manipulation was applied on condition that the patient doesn't feel pain. In case of feeling pain, pressure intensity is decreased.

12. Post-measurements were taken at the end of the program.

Localized manipulation aims to:

1. Identify the position of the injured lumbar discs.
2. Increase additional movements and assisting movements of the injured lumbar discs.
3. Increase lumbar discs range of motion.
4. Decrease pain.
5. Improve muscular work.

Three localized manipulation techniques were used as follows:

- Anterior displacement of herniated lumbar discs.
- Posterior displacement of herniated lumbar discs.
- Lateral displacement of herniated lumbar discs. (Susan et al, 2006: 279-310)

**Statistical treatment:**

The researchers used SPSS software to calculate mean, median, SD and skewness. In addition, non-parametric statistics were used for Wilcoxon and Mann Whitney tests.

**3. Results:**

Table (5) indicated statistically significant differences between the pre- and post-measurements of Group 1 in favor of post-measurements.

**Table (5): Wilcoxon test for difference significance between pre- and post-measurement of group 1 (n=5)**

S	Variables	N		Rank mean		Rank Sum		Z	P
		-	+	-	+	-	+		
1	Trunk right flexion	0	5	0.00	3	0.00	15	-2.06	0.04
2	Trunk left flexion	0	5	0.00	3	0.00	15	-2.03	0.04
3	Trunk forward flexion	0	5	0.00	3	0.00	15	-2.04	0.04
4	Trunk backward flexion	0	5	0.00	3	0.00	15	-2.12	0.03
5	Trunk right rotation	0	5	0.00	3	0.00	15	-2.07	0.04
6	Trunk left rotation	0	5	0.00	3	0.00	15	-2.03	0.04
7	Degree of right thigh flexion to trunk	5	0	3	0.00	15	0.00	-2.02	0.04
8	Degree of left thigh flexion to trunk	5	0	3	0.00	15	0.00	-2.04	0.04
9	Long sitting for measuring distance between right hand and right leg	5	0	3	0.00	15	0.00	-2.06	0.04
10	Long sitting for measuring distance between left hand and left leg	5	0	3	0.00	15	0.00	-2.06	0.04
11	Right leg height over the ground	0	5	0.00	3	0.00	15	-2.04	0.04
12	Left leg height over the ground	0	5	0.00	3	0.00	15	-2.06	0.04
13	Lateral right back muscles strength	0	5	0.00	3	0.00	15	-2.04	0.04
14	Lateral left back muscles strength	0	5	0.00	3	0.00	15	-2.06	0.04
15	Back muscles strength from sitting with pulling dynamometer backward	0	5	0.00	3	0.00	15	-2.12	0.03
16	Abdominal muscles strength	0	5	0.00	3	0.00	15	-2.02	0.04
17	Back muscles strength	0	5	0.00	3	0.00	15	-2.03	0.04

Table (6) indicated statistically significant differences between the pre- and post-measurements of Group 2 in favor of post-measurements.

**Table (6): Wilcoxon test for difference significance between pre- and post-measurement of group 2(n=5)**

S	Variables	N		Rank mean		Rank Sum		Z	P
		-	+	-	+	-	+		
1	Trunk right flexion	0	5	0.00	3	0.00	15	-2.03	0.04
2	Trunk left flexion	0	5	0.00	3	0.00	15	-2.06	0.04
3	Trunk forward flexion	0	5	0.00	3	0.00	15	-2.06	0.04
4	Trunk backward flexion	0	5	0.00	3	0.00	15	-2.06	0.04
5	Trunk right rotation	0	5	0.00	3	0.00	15	-2.04	0.04
6	Trunk left rotation	0	5	0.00	3	0.00	15	-2.03	0.04
7	Degree of right thigh flexion to trunk	5	0	3	0.00	15	0.00	-2.03	0.04
8	Degree of left thigh flexion to trunk	5	0	3	0.00	15	0.00	2.06	0.04
9	Long sitting for measuring distance between right hand and right leg	5	0	3	0.00	15	0.00	-2.03	0.04
10	Long sitting for measuring distance between left hand and left leg	5	0	3	0.00	15	0.00	-2.06	0.04
11	Right leg height over the ground	0	5	0.00	3	0.00	15	-2.12	0.03
12	Left leg height over the ground	0	5	0.00	3	0.00	15	-2.12	0.03
13	Lateral right back muscles strength	0	5	0.00	3	0.00	15	-2.04	0.04
14	Lateral left back muscles strength	0	5	0.00	3	0.00	15	-2.04	0.04
15	Back muscles strength from sitting with pulling dynamometer backward	0	5	0.00	3	0.00	15	-2.12	0.03
16	Abdominal muscles strength	0	5	0.00	3	0.00	15	-2.03	0.04
17	Back muscles strength	0	5	0.00	3	0.00	15	-2.06	0.04

Table (7) indicated statistically significant differences between the post-measurements of Group 1 and group 2 in favor of post-measurements of group 2.

**Table (7): Mann Whitney test for difference significance between post-measurements of group 1 and group 2 (G1=G2=5)**

S	Variables	Rank mean		Rank Sum		U	P
		G1	G2	G1	G2		
1	Trunk right flexion	3.00	15.00	8.00	40.00	0.00	0.008
2	Trunk left flexion	3.00	15.00	8.00	40.00	0.00	0.008
3	Trunk forward flexion	3.00	15.00	8.00	40.00	0.00	0.008
4	Trunk backward flexion	3.00	15.00	8.00	40.00	0.00	0.008
5	Trunk right rotation	3.00	15.00	8.00	40.00	0.00	0.008
6	Trunk left rotation	3.00	15.00	8.00	40.00	0.00	0.008
7	Degree of right thigh flexion to trunk	3.00	15.00	8.00	40.00	0.00	0.008
8	Degree of left thigh flexion to trunk	3.00	15.00	8.00	40.00	0.00	0.008
9	Long sitting for measuring distance between right hand and right leg	3.00	15.00	8.00	40.00	0.00	0.008
10	Long sitting for measuring distance between left hand and left leg	3.00	15.00	8.00	40.00	0.00	0.008
11	Right leg height over the ground	3.00	15.00	8.00	40.00	0.00	0.008
12	Left leg height over the ground	3.00	15.00	8.00	40.00	0.00	0.008
13	Lateral right back muscles strength	3.00	15.00	8.00	40.00	0.00	0.008
14	Lateral left back muscles strength	3.00	15.00	8.00	40.00	0.00	0.008
15	Back muscles strength from sitting with pulling dynamometer backward	3.00	15.00	8.00	40.00	0.00	0.008
16	Abdominal muscles strength	3.00	15.00	8.00	40.00	0.00	0.008
17	Back muscles strength	3.00	15.00	8.00	40.00	0.00	0.008

#### 4. Discussion:

Table (5) indicated statistically significant differences between the pre- and post-measurements of Group 1 in favor of post-measurements. This is a clear indication about the success of the recommended program in achieving its objectives to improve muscular strength, stretch and flexibility without pain. The researchers used special exercises for improving muscular strength of low back muscles (lumbar and sacral), abdominal muscles, lateral muscles and iliac muscles. These muscles fix lumbar and sacral discs. In addition, exercises included stretches to provide muscles with flexibility and elasticity.

Strengthening back and iliac muscles provide the body with balance and decrease pain (Nadler et al 2002: 798). Special exercises are very important for improving functional efficiency of the spine and strengthen low back muscles (Hussain 2003). Rehabilitative exercises improve strength, balance, coordination, power and flexibility in addition to stimulating the cardiovascular system and decreasing muscular stress, stiffness, fatigue and pain (Terjung 2003: 462).

Spinal injuries vary from one person to another according to age, intensity and symptoms. There are several techniques for treating these injuries including physiotherapy, strengthening surrounding muscles, localized manipulation and localized spinal injection (Mitchell & Carmen 2005: 514).

Rehabilitative exercises are useful in treating herniated discs as it increases strength, balance, coordination, power and flexibility in addition to stimulating the cardiovascular system and decreasing muscular stress, stiffness, fatigue, inflammation and pain (Stramme et al 2004: 758). Type of required therapy is identified through symptoms, x-ray, functional tests of the injured part and, in very rare cases including urination problems, neural electrography (Manniche et al 2005: 339).

Cartilages between 4<sup>th</sup> and 5<sup>th</sup> lumbar vertebrae and 5<sup>th</sup> lumbar and 1<sup>st</sup> sacral vertebrae are vulnerable to herniation (Bogduk 2000: 211). Using rehabilitative exercises and physiotherapy like massage and pulling are modern techniques in treating vertebral herniation because of major advances in instruments used in this field (Twomey & Taylor 2006: 637).

Table (6) indicated statistically significant differences between the pre- and post-measurements of Group 2 in favor of post-measurements. This is a clear indication about the success of the recommended program that included rehabilitative exercises and localized manipulation.

The researchers used special exercises for improving muscular strength of low back muscles (lumbar and sacral), abdominal muscles, lateral

muscles and iliac muscles in addition to localized manipulation by a specialized therapist. This technique insured that the body shows optimum physiological response through correcting abnormal relations among body parts. This makes the body feels more prepared to use its potentials to perform natural functions normally (Twomey & Taylor 2006: 615).

Localized manipulation corrects vertebrae positions that moved because of external factors. This increases the efficiency of neural system (Haigh & Clarke 1999: 81). Localized manipulation is best used in treating cervical and lumbar disorders including chronic lumbago that affect groin nerve (Mohseni-Bandqei et al 2002: 197).

Hand pressure applied to the vertebrae to reach max range of motion is an accurate and non-painful procedure used to restore vertebrae to its normal location (Shekelle 2004: 868).

Ministries of health in USA, Canada and UK indicated that localized manipulation of the spine lasts for 2 weeks (3: 5 sessions per week) and then sessions are identified according to health condition and spinal functionality of each patient (Beaty 2002: 213).

Localized manipulation of patients with severe low back pain without pain or orthopedic injuries start during the first month. If the condition is not improved significantly after one month, therapy should stop, and the case is to be reevaluated (Koes et al 2002: 863). If the condition improves then therapy can be extended to more than one month, but outcomes of therapy remain unknown till suitable tests are applied (Coulter 2006: 61).

Localized manipulation of patients with herniated lumbar discs is done without any bone symptoms with more than one technique (Aure et al 2003: 525). Localized manipulation is used with patients with herniated lumbar discs whose condition starts with cartilages exit of the disc till nerve touching. It is prohibited in case of full cartilage exit (Gherkin et al 2003: 898).

Localized manipulation depends on moving discs and joints of dislocated vertebrae as this causes functional disorder in the whole area (Fiechtner & Brodeur 2005: 291). Localized manipulation restores spinal balance and correct movement of discs through applying hand pressure to discs and taking them back to max range of motion (Flynn et al 2002: 352).

Localized manipulation concentrates only on injured areas as an accurate and non-painful procedure for the discs that need to improve its motion (Twomey & Taylor 2006: 629). It is frequently used in disc herniation and cartilage herniation in addition to some joint injuries (Shekelle 2004: 890).

Lumbar area witness more motor work compared with thoracic vertebrae where ribs are located. Degree



and direction of movement in the lumbar area depends on the position of vertebrae. Movement of 1<sup>st</sup> to 4<sup>th</sup> lumbar discs are limited to sagittal plan while movement of 5<sup>th</sup> lumbar disc to 5<sup>th</sup> sacral disc is limited to anterior plan (Childs et al 2004: 377).

Table (7) indicated statistically significant differences between the post-measurements of Group 1 and group 2 in favor of post-measurements of group 2. These results confirmed the efficiency of using rehabilitative exercises in treating this injury as it eliminates functional disorder in the injured part through improving weaknesses of muscles, ligaments and joints. These exercises are used at the end of sharp pain and progression of intensity should be considered (Brain et al 2008: 49).

Localized manipulation of vertebrae in general is similar to traditional interventions like medical care, use of anesthetics and creams and use of rehabilitative exercises. Nevertheless, it is considered as an effective and quick technique to eliminate pain, regardless of the injury intensity. It could be integral in severe and chronic cases in addition to medical treatment and physiotherapy. (Fiechtner & Brodeur 2005: 331).

Localized manipulation has the same effect of other physiotherapy techniques for low back pain. Its effectiveness increases when adding rehabilitative exercises (Childs et al 2004: 398).

Localized manipulation improves the position of injured disc and does not interfere with physiotherapy outcomes and rehabilitative exercises. After severe pain in the lumbar area, Localized manipulation is recommended in addition to other physiotherapy techniques, regardless the intensity of injury (St-Pierre & Gardiner 2006: 643). Localized manipulation is a safe therapeutic technique without any side effects. It can be used with rehabilitative exercises for treating vertebral injuries, on the contrary to other therapies that may have negative side effects on body systems (Koes et al 2002: 887).

### Conclusions:

According to this research aims, hypotheses, methods and results, the researchers concluded the following:

1. Rehabilitative exercises improve and decrease low back pain in general.
2. Localized manipulation has good results in decreasing pain as it moves the injured disc back to normal location without side effects.
3. Localized manipulation and rehabilitative exercises together have positive effects as exercises strengthen working muscles that stabilize lumbar and sacral vertebrae in addition to fixing the injured vertebrae to normal position.
4. Localized manipulation and rehabilitative exercises restored low back range of motion to near

normal in addition to restoring muscular strength of working muscles.

5. The recommended rehabilitative exercises program with Localized manipulation improved functional efficiency of the spine to perform its tasks automatically.

6. The recommended rehabilitative exercises program with Localized manipulation encouraged patients to avoid surgeries and depend on such programs for treating herniated lumbar discs.

### Recommendations:

According to these conclusions, the researchers recommend the following:

- Designing rehabilitative exercises programs with more advanced exercises because of its positive effects on treating vertebral injuries.
- Depending on Localized manipulation as an effective technique for treating herniated discs.
- Merging Localized manipulation with rehabilitative exercises in one program for spinal injuries.
- Localized manipulation needs more study for its techniques in addition to studying modern therapy techniques and using them in rehabilitative programs.
- Holding training courses for physiotherapists on Localized manipulation.

### References:

1. Assendelft WJJ, Bouter LM, and Knipschild PG (2000) Complications of spinal manipulation: a comprehensive review of the literature. *J Fam Pract*;42:(475).
2. Assendelft, W. J., Morton, S. C., Emily, I. Y., Suttorp, M. J., & Shekelle, P. G. (2003). Spinal manipulative therapy for low back pain: a meta-analysis of effectiveness relative to other therapies. *Annals of internal medicine*, 138(11), 871-881.
3. Aure OF, Hoel Nilsen J, and Vasseljen (2003) Manual therapy and exercise therapy in patients with chronic low back pain: arandomized, controlled trial with 1-year follow-up. *Spine*;28: (525).
4. Beatygh. (2002) low back pain knowledge update6: American academy of spine surgeons, (213).
5. Bigos S, Bowyer O, and Braen G, (2004) Acute Low Back Problems in Adults. ACHPR
6. Publication No. 95-0642. Rockville, Md, Agency for Health Care Policy and Research, Public Health Service, U.S. Department of Health and Human Services, (53).

7. Bogduk N. (2000) *Clinical Anatomy of the Lumbar Spine and Sacrum*. Edinburgh: Churchill Livingstone. (193-211).
8. Brain krabak, MD, MBA, David J. and Kenndy MD (2008) Functional rehabilitation of lumbar spine injuries in athlete. *Sports med arthrosc rev*. (47-54).
9. Burton AK, Tillotson KM, and Cleary J (2007) Single-blind randomized controlled trial of chemonucleolysis and manipulation in the treatment of symptomatic lumbar disc herniation. *Eur Spine J*; 9: (202-207).
10. Calliet (1999) *Low back pain 2 nd edition*. Vis Company Philadelphia, ( 90 ).
11. Childs JD, Fritz JM, and Flynn TW (2004) low back Pain Exercise and Manipulation (BEAM) randomized trial: effectiveness of physical treatments for back pain in primary care. *BMJ*; 329: (377-398).
12. Coulter ID (2006) Efficacy and risks of chiropractic manipulation: what does the evidence suggest? *Integr Med*; 1: (61).
13. Delitto A. (2004) Are measures of function and disability important in low back care? *Phys Ther*; 74(5): (452).
14. Deyo RA, Andersson G, Bombardier C, Cherkin DC, Keller RB, and Lee CK (1999) Outcome measures for studying patients with low back pain. *Spine*; 19(18S): (232).
15. Deyo RA. (2003) Measuring the functional status of patients with low back pain. *Arch Phys Med Rehabil*; 69(12): (441).
16. Fiechtner JJ, and Brodeur RR (2005) Manual and manipulation techniques for rheumatic disease. *Rheum Dis Clin North Am*;26: (283-331).
17. Flynn T, Fritz J, and Whitman J. (2002) A clinical prediction rule for classifying patients with low back pain who demonstrate short-term improvement with spinal manipulation. *Spine*; 27: (352).
18. Foster L. (2001) Botulinum toxin A and chronic low back pain: a randomized, double-blind study *Neurology*; 56: (135-149).
19. Frymoyer JW, Nelson R, Spangfort E, and Waddell G. (2002) Clinical tests applicable to the study of chronic low back disability. *Spine*; 16(6): (681).
20. Gherkin DC, Sherman KJ, and Deyo RA, (2003) A review of the evidence for the effectiveness, safety and cost of acupuncture, massage therapy, and spinal manipulation for back pain. *Ann Intern Med*; 138: (898).
21. Haigh R, and Clarke AK (1999) Effectiveness of rehabilitation for spinal pain. *Clin Rehabil*;13(suppl): (81).
22. Hoppenfeld s. (2003) *physical examination of the spine and extremities*. New york: Appleton-century-crafts, (512).
23. Hussain, Karimasayed (2003): Effects of some rehabilitative exercises on decreasing low back pain and some physiological variables in women (35-40 years). PhD dissertation, Faculty of Physical Education – Suez Canal University – Port Said (in Arabic).
24. Jensen IB, Bradley LA, and Linton SJ. (2002) Validation of an observation method of pain assessment in non-chronic back pain. *Pain*; 39(3): (267).
25. Koes BW, Assendelft WJJ, and van der Heijden JMG (2002) Spinal manipulation for low back pain: an updated systematic review of randomized clinical trials. *Spine*;21: (860-887).
26. Manniche C, Asmussen K, Lauritsen B, Vinterberg H, Kreiner S, and Jordan A. (2005) Low back pain rating scale: validation of a tool for assessment of low back pain. *Pain*; 57(3): (317-339).
27. Miller md, Cooper de and Warner jp (1999) *review of sports medicine and low back bain*. Philadelphia: wbsaunders, (314).
28. Mitchell RI, Carmen GM. (2005) Results of a multicenter trial using an intensive active exercise program for the treatment of acute soft tissue and back injuries. *Spine*;15: (514).
29. Mohseni-Bandpei MA, Stephenson R and Richardson B, (2002) Spinal manipulation in the treatment of low back pain; a review of the literature with particular emphasis on randomized controlled clinical trials. *Phys Ther Reviews*;3: (185-197).
30. Nadler SF, and Malanga GA, and DePrince M, (2000) The relationship between lower extremity injury, low back pain, and hip muscle strength in male and female collegiate athletes. *Clin J Spot Mod.*; 10: (89).
31. Nadler SF, Malanga GA, and Bartoli LA, (2002) Hip muscle imbalance and low back pain in athletes: influence of core strengthening. *MrdSci Sports Exerc.*; 34: (776-789).
32. Shekelle PG (2004) Spine update: spinal manipulation. *Spine*,19: (858-890).
33. St-Pierre D, and Gardiner PF. (2006) The effect of immobilization and exercise on muscle function: a review. *Physiother Canada.*, 39: (643).
34. Stramme SB, Frey M, and Harlem OK (2004) Physical activity and health: Part II. *J Cardiac Rehabil* 2004;4:364-375.
35. Taimela S, Kankaanpaa M, Luoto S. The effect of lumbar fatigue on the stability to sense a change in lumbar position: a controlled study. *Spine.*;24: (734-758).

36. Susan I. Edmond, p.t., d.sc.,o.c.s (2006) joint mobilization manipulation / extremity and spinal techniques. University of medicine and dentistry of new jersey, second edition, (297–310).
37. Taimela S, Kankaanpaa and M, Luoto S (1999) The effect of lumbar fatigue on the stability to sense a change in lumbar position: a controlled study. Spine.;24: (265).
38. Terjung RL (2003) Exercise and Sport Sciences Reviews. New York; MacMillan.;13: (462).
39. Twomey L, and Taylor J (2006) Spine update: exercise and spinal manipulation in the treatment of low back pain. Spine;20: (615-629).
40. Watkins r.g. (2003) the spine in sports st.louis:mosby, (986).

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