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Effect of Cognitive Behavioural Therapy in Treatment of Chronic Non-Specific Low Back Pain

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ABSTRACT
Background: Low-back pain is a major health and economical problem that affects populations around the world. Chronic low-back pain, in particular, is a major cause of medical expenses, work absenteeism, and disability.
Objective: To explore the effect of adding cognitive-behavioral therapy to physical therapy interventions in patients with chronic non-specific back pain. **Patients and methods:** 20 male and female patients between 25 and 40 years old diagnosed as chronic non-specific back pain with central sensitization and fear avoidance behaviors symptoms participated in this study. Patients were randomly assigned into two groups. The first group was treated by cognitive behavioral therapy (graded exposure and graded activity) in addition to physiotherapy the second group was treated by physical therapy interventions which was given only 3 times/week for 4 consecutive weeks.
Results: Descriptive statistics was used to identify each variable's mean and standard deviation. A paired t-test was used to compare characteristics of patients between both groups. Pre-treatment results showed no significant difference in both measured variables of Oswestry, and pain in both groups ($P > 0.05$). On the other hand, post-treatment results showed a significant decrease in the Oswestry, and pain only in group A (the study group).
Conclusion: Adding graded exposure and graded activity as an operant cognitive behavioural therapy approach to physical therapy program is more beneficial than physical therapy program alone. More data and follow up needed for this study.
Keywords: Cognitive behavioral therapy, Graded exposure, Graded activity.

INTRODUCTION

It's found that 70% to 85% of all adults suffer from low back pain affecting them in their life [(1)]. About 42% to 75% of patients have persistent back pain after twelve months, which affects most of costs in healthcare and disability system. So, chronic low back pain stills a burden health problem worldwide [(2)].

Most of 85% of low back pain patients are categorized into non-specific chronic low back pain. It's referred to as a non-recognizable, unknown specific pathology such as, spinal canal stenosis, radicular pain, cauda equina syndrome, radiculopathy compression fracture, spondyloarthropathy and malignancy [(3)]. There is a strong evidence that non-specific chronic back pain affects many other aspects of body reactions e.g. psychological (pain-related fear, feeling distress and negative beliefs), social (stress of life), lifestyle factors (poor sleep and lack of activity), behavioral responses to pain (avoidance of protective behaviors) and guarding leading to distress and disability and cycle of pain [(4, 5, 6)].

Understanding of chronic pain disorders has been greatly taken into consideration. Over the past decades, it became obvious that most of chronic muscle and skeletal pain is characterized by continuous changing of central nervous system process. In other word, the response of neurons to input from uni-modal and polymodal receptors is increased, which results in what is called pathophysiological state that is called central sensitization [(7)]. Central sensitization is defined as dynamic tactile allodynia, pressure hyperalgesia and pain hypersensitivity that is felt by humans producing pain hypersensitivity and secondary changes in brain activity would be seen by imaging techniques or electrophysiological studies [(8)].

Chronic low back pain management is categorized into different strategies like exercise, medication, and behavioral therapy. The primary hypothesis underlying a behavioral therapy method is that pain and its current disability are not only affected by recent pathophysiology but also by social factors and psychological problems. Chronic low back pain is not a physical problem only but also is affected by the patients' behaviors and belief, illness behaviors and psychologic stress [(9)].

A review including cognitive behavioral therapy for chronic low back pain, which includes thirty randomized-control trials revealed that behavioral treatments have no difference in intermediate and long-term effects on pain or disability status. There were few or no changes between behavioral therapy and group exercise in improving pain and distress results over the inter-mediate to long-term although in comparison there was only low evidence in results. So, more researches are needed [(10)].

The purpose of this study was to investigate the effect of cognitive behavioral therapy in treatment of chronic non-specific low back pain.

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PATIENTS AND METHODS

Twenty male and female patients allocated by sample-size calculation by G power analysis between 25 and 40 years old diagnosed as chronic non-specific back pain were included in this study. Patients were evaluated by Blind assessor (research assistant) in pre-test and post-test for function by ODI questionnaire and pain by numerical rating scale. The main investigator performed the physical therapy program after referral by blind assessor after assessment. Main investigator started the treatment based on the randomization made by the software after the referral, so he was not aware by the assessment results before and after the treatment and the assessor did not know the randomization results and the patients' group selected for treatment. So, these procedures were done by **double blind** procedure for the main investigator and research assistance.

Selection criteria: Patients were randomly assigned into two groups through computer software. We put 20 patients on the software program and the program assigned it randomly. The first group was treated by cognitive behavioral therapy (graded exposure and graded activity) in addition to physiotherapy. Second group was treated by physical therapy interventions, which was only given 3 times/week for 4 consecutive weeks.

Instrumentation: Arabic Oswestery Disability Index (ODI) for functional assessment [(11)] and numerical rating scale for pain [(12)].

ODI assessment: Patients complete a questionnaire, which indicates a percentage score of level of function in daily living activities in pre-sessions and after end of sessions. This questionnaire examines levels of function every day in ten daily living activities. The categories were scored from zero to five (6 categories). If all 10 sectors are finished the result is calculated as follows: if 20 the total result out of 50 total possible score x 100 = 40%.

Scores: 1- Zero to twenty percent: Minimal disability. 2- Twenty one to forty percent: Moderate disability. 3- Forty one to sixty percent: Severe disability. 4- Sixty one to eighty percent: Crippled 5- Eighty one to one hundred percent: These patients exaggerate their symptoms.

Numerical rating scale: patients signed the degree of pain from (0 to 10) the assessment was done in pre-treatment and post-treatment as an outcome measure for pain intensity.

Therapeutic Procedures:

The selected patients based on inclusion criteria were randomized into two groups**:**

Cognitive behavioral therapy with physical therapy interventions group:

a) First 3 sessions of instructions about pain (physiology of pain and maladaptive cognition about movement integration) [(13)].

b) Graded exposure and activity exercises: 4 weeks 12 sessions mainly focus on daily function movement exercises.

1- Graded exposure: This method follow a form to which the patient gradually was exposed to previously, fearful and avoided tasks and pain excitement. These activities are start at a low level that respond to low amounts of fearful positions and movements then increased to situations that take more amounts of fearful activities gradually patients are demanded to create fearful activities. The exposure began by the lowest fearful activity then the therapist assists the patient to evaluate the exposure and its results. And then address irritated also mal-responsive thoughts, which result in the anxiety-related with the activity to be reduced.

2- Graded activity exercises: The recent postural and movement behaviors incorporated to person pain functional activities related to their goals to generalize learning and construct self-confidence. The program concentrated on function activities and develops in order to decrease the pain to fulfill function goal and increase daily activity.

3- Lifestyle change: encouragement to gradually increase physical and functional activity if not enough [(14, 15)].

The sessions were divided into 30 minutes traditional physical therapy program same as group 2, 15 minutes cognitive behavioral therapy interventions.

1- Graded exposure exercises:

Sitting flexion trunk

Standing trunk flexion

Figure (1): Graded exposure exercises

2- Graded activity exercises:

Spinal rotation

Knee to chest

Figure (2): Graded activity exercises.

3-Life style change:

Holding heavy objects

Figure (3): Life style exercises.

The exercises mentioned previously were reported by **Springer *et al.*** [16] and **Moraes *et al.*** [17].

3- Physical therapy group in the form of:

A) Core stability exercises: Plank exercises -Pelvic floor exercises – abdominal exercises [18].

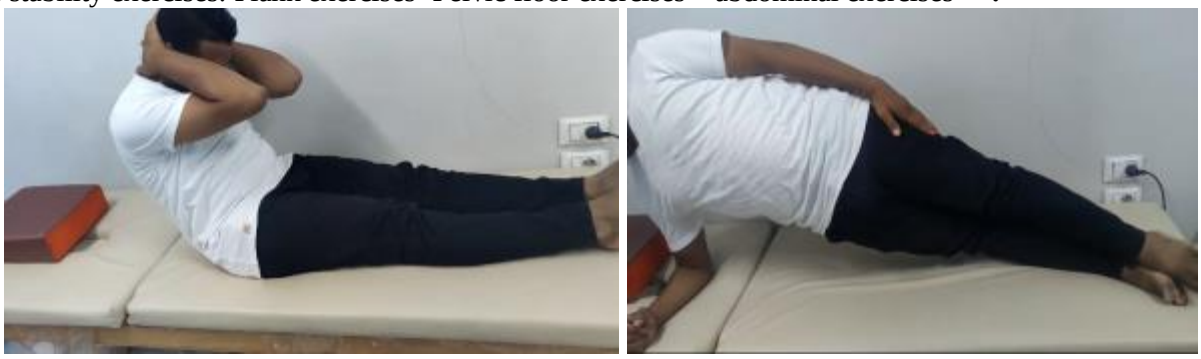

Figure (4): Abdominal exercises.

B) Strengthening exercises Bridging – straight leg raise- gluteus medius strengthening -gluteus maximus strengthening [19, 20].

Figure (5): Strengthening of lower limb muscles.

Physical therapy program based on a systemic review on non-specific low back pain [21].

This group session is about half hour per session, 3 times per week 4 weeks in total of 12 sessions.

Ethical approval:

Ethical approval was obtained from the Scientific Research Ethical Committee of Faculty of Physical Therapy, Cairo University. NO: P.T. REC/012/003039. Every patient signed an informed written consent for acceptance of the study. This work has been carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Data analysis

Descriptive statistics were used to identify each variable`s mean and standard deviation. To compare characteristics of patients between both groups a paired t-test was used. A Chi-square test was used for comparison among two groups in age and gender. The statistical significance level for different tests was set at p-value ≤ 0.05. IBM statistical software version 21 (Chicago, IL, USA) was used to perform all the statistical analyses.

RESULTS

General Characteristics of the Subjects:

In this study, 20 patients with chronic non-specific low back pain were assigned randomly into two groups.

Group (I) (Study group): Twelve patients were included in this group. Their mean age was 28.82 ± 2.750 years. The number of males was 6 with a percent of 60% and the number of females was 5 with a percent of 40%**.**

Group (II) (Control group): Nine patients were included in this group. Their mean age was 29.56 ± 3.435 years, and the number of males was 3 (40%) and the number of females was 6 (60%).

There was no significant difference between the two groups regarding age and gender as shown in table (1)

Table (I): Comparison mean values of demographic data between two groups.

Variables		Group I (n=11)	Group II (n=9)	P-value
Age (Year)		28.82± 2.750	29.56± 3.435	0.480
Gender N. (%)	**Male**	6 (60%)	3 (40%)	0.564
	Female	5 (40%)	6 (60%)	0.934

Numerical Data are expressed as mean ± SD or number (%) P-value > 0.05: non-significant

Arabic Oswestry Disability Index (AODI):

i) Within group:

Regarding Arabic Oswestry Disability Index pre- and post-treatment for group (I), there was a significant difference between pre and post treatment as the mean value of pre-treatment was 18.45 ± 9.472 and the post-treatment was 12.91 ± 8.408 (P-value = 0.0001. The percentage of improvement was 30%.

For group (II), there was non-significant difference between pre- and post-treatment as the mean value of

pre-treatment was 15.44 ± 6.996 and the post treatment was 9.78 ± 5.341 (P-value was 0.487. The percentage of improvement was 37%.

ii) Between groups:

Concerning the Arabic Oswestry Disability Index pre- and post-treatment, table (2) showed that there was no significant difference in pre-treatment values (p-value was 0.120). While, there was a significant difference in the post treatment values where e p-value was 0.0001.

Numerical Rating Scale for Pain:

i) Within group:

Table (II) demonstrated that there was a significant difference between pre- and post-treatment of the Numerical Rating Scale for Pain in group (I) as the mean value of pre-treatment was 7.62 ± 8.141 and for post-treatment was 5.25 ± 7.103 (P-value was 0.00010. The percentage of improvement was 31%. Also, there was non-significant difference between pre- and post-treatment of the Numerical Rating Scale for Pain as the mean value of pre-treatment was 17.10 ± 7.456 and the post-treatment was 11.50 ± 6.766 (P-value was 0.214) and the percentage of improvement was 33% (Table 2).

ii) Between groups:

There was no significant difference in pre-treatment values between both groups (p-value was 0.593). While, there was a significant difference in the post-treatment values (P = 0.0002).

Our findings in pre-treatment showed no statistical significant difference in both measured variables of the Arabic Oswestry Disability Index, and Numerical Rating Scale for Pain in both groups. On the other hand, post-treatment results revealed a statistical significant decrease of Arabic Oswestry Disability Index, and Numerical Rating Scale for Pain only in the group I (the study group) as shown in table (2).

Table (II): The t-test design for all dependent measurement variables between and within the two groups

Variables		Groups		P-value
		Group I (n=11)	Group II (n=9)	
Oswestry	Pre-treatment	18.45± 9.472	15.44± 6.996	0.120
	Post-treatment	12.91± 8.408	9.78± 5.341	0.0001*
	Improvement %	30%	37%	
	P-value	0.0001*	0.487	
Pain	Pre-treatment	7.62± 8.141	17.10.± 7.456	0.593
	Post-treatment	5.25± 7.103	11.50± 6.766	0.0002*
	Improvement %	31%	33%	
	P-value	0.0001*	0.214	

SD: standard deviation, P-value: probability value,
*non-significant (P-value >0.05).

DISCUSSION

The study revealed **a** significant decrease in the Oswestry and pain only in the first group. So, adding cognitive behavioral therapy to physical therapy program has a good effect on reducing pain and increasing functionality.

The combination of cognitive behavioural therapy with exercise therapy looks like to be no more beneficial than the discrete component alone. Some evidence point in consideration that the way of combinations being more useful than exercise, while not being more useful than cognitive behavioral therapy. Essentially, the resultant evidence indicates that cognitive behavioral therapy whether alone or in relation with exercise therapy, is more or had same result as exercise therapy in management of chronic back pain [(22)]. Combining behavioral and cognitive approaches to graded exposure and graded activity showed an improvement of activity tolerance. Such approaches have been tested in both groups and individual sessions [(23, 24)].

Individual-graded activity sessions have revealed similar effect in comparison with motor control exercises and physiotherapy in patients with chronic non-specific low back pain. In patients with chronic low back pain, group sessions of graded activity revealed a high reduction in pain intensity in an observational study [(25)].

Trials showed that graded activity in comparison with other types of exercises showed no statistically significant difference from graded activity and other types for exercise in disability and pain [(26-27)]. Although, another study [(28)] did not find that graded activity is more responsive than exercises.

These findings are not related in results with many studies that revealed that cognitive behavioral therapy interventions resulted in improved outcomes compared to usual physiotherapy care or control group. There may be unmeasured variables that influenced our study results. So, more variables and number of patients are needed to conclude final results. And more future researches are needed to reveal most accurate results with more number of patients and more comparisons.

CONCLUSION

Adding graded exposure and graded activity as an operant cognitive behavioral therapy category to physical therapy program is more beneficial than physical therapy program alone. More data and follow up are needed for the study.

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