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Kyphosis patients' chiropractic program proposal and its impact on physical fitness components

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Abstract- This research consists of five chapters. In the first chapter, researchers addressed thoracic vertebrae deformities caused by false daily habits (ex. Prolonged bad posture). They tried to eliminate or minimize the resultant negative impacts via therapeutic techniques and exercise; and tried to prevent the worsening of the condition that leads to deformities and hence the necessity of surgical intervention.

This study aims at the preparation of a rehabilitation chiropractic program and testing its impact on some physical fitness components.

In the second chapter, researchers address the concept of deformity, spinal cord autopsy, and spine curve degree; in addition to the causes and the impact of physical exercise in avoiding deformities.

The experimental approach was followed in this research with one focus group. Suitable tests were picked and pretests were performed on 10 patients then they were given the rehabilitation program. The first phase lasted 3 weeks; 4 units per week. This phase consisted of therapeutic techniques such as electrical stimulation, infrared radiation, and massage. The second phase lasted 6 weeks; 4 units per week, and at the end, post tests were performed.

The results were processed using proper statistical tools and showed that the program reduced kyphosis in targeted patients and improved physical fitness components.

Researchers concluded the following:

The application of the prepared program showed significant improvements in the chiropractic treatment of targeted patients.

The prepared program showed positive impacts in terms of some physical components (arm muscles endurance, Squat (legs), speed, agility, and balance)

Keywords: chiropractic program, physical fitness, kyphosis

I. RESEARCH INTRODUCTION

1.1. Introduction and research significance

Taking care of the "human" is increasingly neededespecially after the recent development that held several advantages and a few disadvantages or unpleasant phenomena that bothers people. Fixing these unpleasant phenomena is achievedthrough developing programs, therapeutic rehabilitation, and physical exercises. Overcomingthe falsedaily behavior is achieved by learning and constant and proper practicesin work and daily activities.

One of the most significant phenomena is chiropractic therapy and especially treating kyphosisthat appears in the chest area. In his daily life, a person's spine may be affected by extended sitting down because of his work's nature. The spine is very important because the ribs are attached to it, it holds the head, the spinal cord is located in it, it attaches the upper to the lower part of the body, and is responsible for standing straight. Identifying the normal shape of the spine is done by detecting how straight it isfrom the back view or by the presence of 4 curves from the side view.

Kyphosis in the chest area usually results from birth defects that occur in the spine, or from exerting huge efforts, walking incorrectly, and sitting for a long time on the desk or in front of the computer.
Back kyphosis is a very common problem. What we will be tackling in this research is the thoracic vertebrae kyphosis and we will be working on treating and getting rid of it using exercises and rehabilitation programs:weightlifting exercises for the weak areas and physical exercise and excitation of involved muscles.

1.2. Research problem

The research problem focused on the increased levels of thoracic vertebrae kyphosis. This phenomenon is noticed between individuals who sit down for a long time or exercise incorrectly and neglect physical examinations that detect this type of deformity to work on fixing and treating it by specialists. There is a significant deficit in studies concerning therapeutic exercises and those especially targeting chiropractic kyphosis therapy for athletes and non-athletes.
For resolving this problem, the researcher seeks to fix kyphosis and treat it by therapeutic physical exercise, and thus studied the impact of using the (Kyphosis patients' chiropractic program proposal) on physical fitness components.

1.3. Research objectives

Preparing a spine kyphosis chiropractic program
Discovering the impacts of following the prepared chiropractic program

1.4. Research hypotheses

spine kyphosis chiropractic program has a positive impact
variations between pre and posttests are detected in favor of posttests
variations occur between control and experimental groups in favor of the experimental

1.5. Research fields

People: a sample of 10 kyphosis patients randomly picked for physical exercise treatment.
Period: from December 5, 2018, till March 25,2019
Place: Alfalsaja laboratory – physical therapy and rehabilitation laboratory- Al-Ithqal Hall- University of Al-Qadisiya's faculty court -College of physical education and sport sciences.

II. RESEARCH METHODOLOGY AND FIELD ACTION

2.1 Methodology

The researcher used the experimental approach as one of his main plans: the pre and posttests and the equivalent groups method.

2.2 Research sample

The research's restricted deliberate sampling consisted of 10 individuals with thoracic vertebrae kyphosis, divided into control and experimental groups with an age range of (20-25 years). The restricted deliberate sampling requires limiting the individuals who meet the requirements in the original community, the restricted sampling is the sampling used by the researcher in this type of research. (13: 31)

2.3 Research sample homogeneity

The sample used is homogeneous to confirm the suitability of the tests and measurements done on the studied age group. The homogeneity is attained by the normal distribution curve that uses height, weight, and age variables. Table (1) shows the homogeneity of the research sample.

Table 1 shows homogeneity of research sample

T	variables	Unit of measurement	Mean	Standard deviation	Coefficient of variation (Cv)
1-	Height	cm	171.466	4.227	%2.465
2-	Weight	kg	71.033	5.243	%7.381
3-	Age	year	20.922	1.412	%6.748

As shown in table (1), the values of coefficient of variation were less than (30%) which indicates that the sample is homogeneous.the more the coefficient of variation is near (1%) the more homogeneous the sample is, and if the Cv surpassed (30%) then the sample is non-homogeneous.

Table 2 shows equivalence of research sample

Tests	Experimental group		Control group		Calculated T-value*	Significance of variation
	mean	Standard deviation	mean	Standard deviation		
Arm muscles endurance	3.080	0.277	2.680	0.432	1.741	random
Bench Press (arms)	33.800	3.963	33.200	3.898	0.241	random
Deadlift (back)	56.000	4.183	53.000	2.738	1.342	random
Squat (legs)	46.000	4.183	43.000	4.472	1.092	random
Speed (30m)	5.500	0.158	5.240	0.427	1.275	random
Agility	2.000	1.581	2.4000	1.516	0.408	random
Balance	193.40	3.130	189.60	4.037	1.663	random
Kyphosis (cm)	5.456	2.832	5.198	2.811	1.812	random

*T- value at significance level (0.05) and degree of freedom (8) = (1.860)

Tools and equipment

1. Conformity device for kyphosis degree measurement
2. Scale for weight measurement
3. Measuring tape for vertebral column length measurement
4. Data form
5. Electrical muscle stimulator
6. Clinical bed (2)
7. Calculator
8. Watch for calculating the duration of each therapeutic unit
9. Computer
10. Balance test device
11. Medical back belt

2.4 Data collection tools

2.4.1 Pilot Study

A Pilot study took place from February 2, 2019, till February 7, 2019, on thoracic vertebrae kyphosis patients. It was done to test the quality of deformity measurement devices and the accuracy and validity of measurements and tests related to the research. The pilot study is then, the initial experimental study done by the researcher on a small sample to test the tools prior to the research.

This study consisted of all presented research measurements and tests for checking the validity and accuracy of the suggested devices. The researcher presented the devices before a group of doctors (34) in this field of expertise and they all confirmed that the devices target the objective which is the measurement of the degree of deformation (10: 139).

Achieving the coefficient of stability was done by testing the same sample twice without a major gap in the time interval. According to the coefficient of correlation between performances in both times, the stability of the test is determined. (8: 19)

2.4.2 Work parameters

Given that this research contains tests and measurements and a team of several members, the researcher created a team of people of expertise in this field and trained them to be able to run tests and take measurements. They were also trained tointroduce the program items because the program was prepared to clarify the researcher's role in the supervision of tests and measurements.
To ensure the objectivity of the devices, experts tested the degree of compatibility between to examiners who examined the same sample while performing a certain task. The degree of objectivity was measured through the coefficient of correlation between results given by a certain lab with another lab to the same sample doing the same task. (10: 390)

2.4.3 Data form

The researcher prepared a form to fill data: appendix (1), the information page contained several questions to participants such as name, age, height, educational stage, actual age, type of post-education work or training, type of shoes they wear, is there any injury in the chest area, and other related questions. This form was given to the participants to collect data before proceeding with the test.

2.4.4 Tests and measurements

After the pilot study and final settlements on the test items, the researcher ran the tests and measurements in the period between February 1, 2019, and February 7, 2019. After finalizing tests and measurements, prepared program items were given for 6 weeks. The following is the sequence of tests and measurements:

1- Weigh-in by a medical scale
2- Height measurement by a measuring tape
3- Kyphosis degree measurement by a kyphosis Conformity device (physical test for thedegree of kyphosis)
4- Physical components test

a. Trunk extension flexibility test

The test requires the participant to lay on his stomach on the floor, put his hands behind his back, the assistant holds the participant's hips to not allow any lower body movement, the participant thenperforms the upper trunk flexibility test in the maximum effort that he can reach.The height between his body and the floor is measured.

b. Rods Test (Conformity device test)

Measured from above the crease up to the sacral dimple, two shots are given to each participant and the best is recorded.

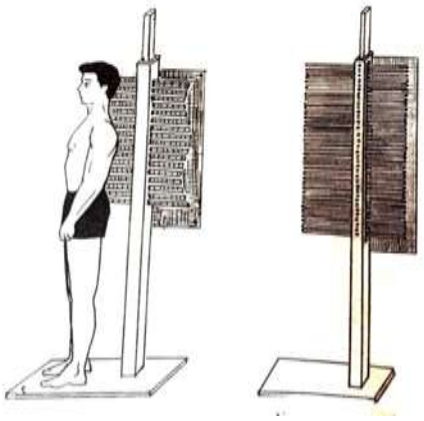

Figure 1

c. 30m run speed test

This test includes 3 parallel lines drawn on the ground. The distance between the first and the second is 10 m and between the second and the third is 30 m. The participant stands behind the first line and runs when given the signal until he reaches the third line. The time is calculated from the moment he steps on the second line until he reaches the third (30 m). Each participant is given two shots (7: 207).

d. Shooting a medical 5 kg ball

The place of shooting the ball is marked by parallel lines and a measuring tape is placed on the side from the start line to few meters ahead. The participant stands behind the starting line, places the ball above his head using both of his hands, and shoots the ball by swinging his hands a bit to the back. Each participant is given two shots.

e. Balance test

This test uses a balance measurement device, and the computer screen shows the balance specific program. The results are collected from 6 different balance tests with various difficulties without any interference from the researchers or device managers. Degrees of the test begins froma value 1 and etc.

Figure 2 shows balance test

2.5 The prepared chiropractic program

The researcher developed a chiropractic program that aimed at correcting and treating spinal cord kyphosis and reducing its negative effects by enhancing the damaged muscle sets. The program was presented to a group of specialized experts in this field. The program took a total of 7 weeks divided into two phases: the first is using a muscle excitation device, infrared radiation, and physiotherapy by an electric vibrator; the second was using therapeutic exercises. The start date was January 20, 2019, until March 6, 2019.

Phase one:
The phase of using muscle excitation device, infrared radiation, and massaging (physiotherapy) using a manual electric vibrator. The goal of using heat and vibrating massage in this phase is to reduce spasm if any exists, reduce the pain in the targeted area, and to help stretch the back muscles in the chest area. The duration of every session of infrared radiation was about (15-20) minutes (14: 111), while that of back massage (starting from the shoulders to the lower chest area) was around (5-7) minutes. The duration of one massage session in the chiropractic program is the duration of one vibration massage (3-15) minutes (9: 203). Both techniques were done in the form of 3 sessions per week (Monday, Wednesday, and Saturday) and they lasted one week only. These techniques were used as an introduction and preparation to phase two which is therapeutic exercises. Muscle fibers and other tissues become more flexible and more tolerant of therapeutic exercises after using excitation and heat. Note that one of the massage effects is increasing the temperature of both skin and the massaged area (4:231).

Phase two:
This is the phase of using therapeutic exercises that aim at strengthening abdominal and ligament muscles, lower back muscles, and chest area muscles. By this, equilibrium is achieved between the functions of the targeted area muscles which is considered the basis of kyphosis chiropractic treatment. In this phase, the used exercises aremotion exercises and a few mixed exercises that require static positions and movements within the same exercise with specific sets and reps. These exercises are done slowly until muscles function fully because slow rhythm and right body control shall be taken into consideration in the exercises that are targeted to fix a form. They may also require static exercises and an ascending rhythm (8: 239).
This phase lasted for 6 weeks including 24 therapeutic and training units divided into 4 units per week (Mondays-Wednesdays-Thursdays-Saturdays). In the first unit, 7 reps were done, these reps increase by 1 rep in each unit until they reach 30 reps. Static position duration -in some exercises that require static positions as well as speed- is (4-6) seconds and a pause of 2 seconds is taken in-between positions (15: 92).
The therapeutic exercises stage includes several exercises that focus on back and abdominal muscles, stretching lower back muscles, and strengthening chest and shoulder muscles. These exercises included several positions (standing- lying down- sitting down- laying flat- resting and long setting). Exercises in this phase included about half a minute breaks between one exercise and the other, for the break/ exercise method relies on the philosophy of training. (11:1977) explains that the workout period shall be double that of the break (-1 0.5) (12:606). Relaxation exercises are done through heavy breathing (heavy inhale and exhale) during breaks between exercises and even after the exercises are done. Relaxation exercises are very necessary especially during form and therapeutic exercises (41 p.51). They are also beneficial for achieving a

balanced inhale and exhale that is in harmony with the main exercises. Harmonizing these exercises with psychological exercises helps in the amelioration of the breathing process (5: p.52). The duration of the therapeutic training unit in this phase is around (14-16) minutes in the first unit, then it gradually increases reaching 48 minutes at the final unit of the program. Increasing the intensity of the exercises gradually is necessary, starting with few reps to a relatively normal number of reps where it starts in the first week with (7-10) times. Gradually increasing the intensity is also necessary for achieving an extended muscular endurance (5: 37). Treatment of spinal cord kyphosis needs repeating the exercises increasingly until reaching the maximum limit and achieving 30 reps. After finishing the last therapeutic unit in phase 2, the prepared chiropractic program is then done, so the sample is now ready for posttests and measurements - knowing that the participants haven't taken any medicine during the period of the program.

2.6 Statistical methods

Researchers used the following statistical methods
- Mean
- Standard deviation
- Coefficient of variation
- T- test in symmetrical samples
- T-test in asymmetrical samples

III. FINDINGS PRESENTATION, ANALYSIS AND DISCUSSION

We willpresent, analyze, and discuss the findings according to data collected by the researcher throughout tests and measurements. The data is then transformed into tables and graphs as visual aids for the research because it minimizes the error in following research steps and enhances and strengthens scientific evidence.

3.1 Presentation of the findings: mean, standard deviation, and calculated t-values and their significance for research variables between pre and posttests in the experimental group

Table 3 presents mean, standard deviation, calculated t-value, and the significance of these values for the variables between pre and posttests

Tests	Pretests		Posttests		Calculated T-value*	Significance of variation
	mean	Standard deviation	mean	Standard deviation		
Arm muscles endurance	3.080	0.277	3.760	0.336	6.310	Significant
Bench Press (arms)	33.800	3.963	39.400	4.560	2.333	Significant
Deadlift (back)	56.000	4.183	62.000	5.700	2.887	Significant
Squat (legs)	46.000	4.183	52.000	5.700	6.000	Significant
Speed (30m)	5.500	0.158	4.560	0.364	4.290	Significant
Agility	2.000	1.581	5.000	1.581	9.487	significant
Balance	193.40	3.130	204.80	4.919	10.156	significant
Kyphosis (cm)	5.456	2.832	1.720	2.763	7.430	Significant

*T- value at significance level (0.05) and degree of freedom (4) = (2.132)

3.2 Presentation of the findings: mean, standard deviation and calculated t-values and their significance for research variables between pre and posttests in the control group

Table 4 presents mean, standard deviation, calculated t-value, and the significance of these values for the variables between pre and posttests in the control group

Tests	Pretests		Posttests		Calculated T-value*	Significance of variation
	Mean	Standard deviation	mean	Standard deviation		
Arm muscles endurance	2.680	0.432	3.300	0.331	3.499	Significant
Bench Press (arms)	33.200	3.898	37.200	3.346	3.068	Significant
Deadlift (back)	53.000	2.738	58.000	4.698	2.211	Significant
Squat (legs)	43.000	4.472	48.000	4.472	2.449	Significant
Speed (30m)	5.240	0.427	4.800	0.158	2.105	Random
Agility	2.400	1.516	3.100	1.581	2.099	Random
Balance	189.60	4.037	191.60	2.701	2.113	Random
Kyphosis (cm)	5.198	2.811	4.710	2.983	1.349	Random

*T- value at significance level (0.05) and degree of freedom (4) = (2.132)

3.3 Presentation of the findings: means, standard deviation, and calculated t-values and their significance for research variables between pre and posttests in both control and experimental groups

Table 5 presents mean, standard deviation, calculated t-value, and the significance of these values for the variables between pre and posttests in experimental & control groups

Tests	Experimental group		Control group		Calculated T-value*	Significance of value
	mean	Standard deviation	Mean	Standard deviation		
Arm muscles endurance	3.76.	0.336	3.300	0.331	2.178	significant
Bench Press (arms)	39.400	4.560	37.200	3.346	0.870	random
Deadlift (back)	62.000	5.700	58.000	4.698	1.215	random
Squat (legs)	52.000	5.700	48.000	4.472	1.234	random

Speed (30m)	4.560	0.364	4.800	0.158	1.350	random
Agility	5.000	1.581	3.100	1.581	2.000	significant
Balance	204.80	4.919	191.60	2.701	4.462	significant
Kyphosis (cm)	1.720	2.763	4.710	2.983	5.398	significant

*T- value at significance level (0.05) and degree of freedom (8) = (1.860)

3.4. Findings Analysis

After presenting the findings collected from pre and posttests done on both groups, the posttests for the experimental group showed significant results when compared to pretests. This means that the method prepared by the researchers has enhanced all the physical components because it was prepared according to a scientific basis in terms of intensity, repetition, and progression of the exercises. The program also contains therapeutic techniques that prepared the muscles for accepting the chiropractic program and increased the strength, which results in strengthening the ligaments, tendons, and other tissues. The way in which the training unit was designed, has had a huge effect on increasing the level of physical tests. How the units were designed and combined has enhanced the muscular endurance level of the research sample (9:125).

"The organized physical exercise leads to the increase in the efficiency of the muscular system. This is reflected through the muscular ability to produce power- whether static or dynamic" (1:15).

Hara said: the physical fitness program leads to "strengthening muscles and muscular groups through general exercises" (11:169).

The proper training greatly helps in enhancing specific physical components such as speed, reflex, strength, endurance, and especiallyagility (9: 172) for it has a big role in performing movements. "Agility is one of the main elements of fitness, pre-workout warmups, and the workout itself. It results in a better performance" (3:518).

For back curvature (serious back kyphosis), this program along with natural therapy resulted in enhancing the agility and strength of the experimental group members. It was discovered that the flaw was still in the functional stage and didn't pass to the other stages. This was confirmed by Saleh Bashir-that the flaw in the figure can be fixed if it happened in the functional stage, through designing a specific group of exercises that aim at fixing the curvature. (6:92)

In the control group that was normally enjoying its daily tasks, there was an improvement in strength because of daily work; but no improvement was shown in other physical components such as agility, balance, and speed because these components need specific exercises that are based on the proper scientific basis for achieving the targeted improvement.

IV. CONCLUSIONS AND RECOMMENDATIONS

Conclusions:

- Therapeutic exercises and techniques in the program prepared the muscles and the ligaments to accept the chiropractic program; leading to fixing kyphosis in research participants.
- The prepared program increased muscular strength because it was prepared based on scientific standards.
- The program, along with natural treatment, leads to improvement in agility and freedom of movement for patients.
- Balance is improved due to the proportional distribution of strength and weight throughout the body.

- There is a possibility of fixing the flaws if it was still in the functional stage and did not pass to the other stages.

Recommendations

- The necessity of using therapeutic techniques and exercises for faster recovery and not just relying on one without the other.
- Paying attention to physical fitness components for achieving the perfect figure.
- The necessity of noticing the changes from an early age to avoid deformations and going into more severe stages of deformations.

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