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The Effect of Rehabilitation Exercises on Correcting and Improving Spinal Deformities

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Abstract

The nature of some professions (such as dentistry, barbering, blacksmithing, lathe work, etc.) Demands continuous bending during work, directing to a hunchback that may not be very noticeable initially but will certainly become more apparent in the future and may, in some, Participants result in Persistent mobility impairment. This work nature also often causes Marked pain for those in these professions, negatively Shaping work quality. The researcher used the experimental method, Classified as most suitable for the nature of the research. The study sample Comprised of (12) dentists from the Rusafa district of Baghdad Governorate, representing a representative sample of professions. After Executing rehabilitation exercises, the researcher concluded that continuous work leads to bodily deformities, particularly spinal deformities. Additionally, dental work affects the spine and causes deformities. Rehabilitation exercises are important for professions, especially those whose work Comprises standing for long hours throughout the week.

Keywords: Rehabilitation exercises, corrective exercises, spinal deformities, occupational postural deformities.

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Introduction

A lot of countries, especially developed ones, have Employed advanced programs to give attention for working individuals. During their daily work,members are encounterto considerable stress and strain on their bodies consequence of prolonged standing and bending. This strain can lead to various physical disabilities and postural problems, restricting individuals from achieving a natural posture due to postural deviations that disrupt and impede proper movement. Posture is key to Kinetic coherence among bodily segments of the body. As Bye & Others (2017) states, "The shape of the body generally Is dictated by the skeletal system, which is a Complex architect of varying lengths, sizes, and shapes, arranged together in an intricate structure that gives the human body its magnificent appearance and simultaneously helps the individual perform their functions in life." The spine is a fundamental pillar of the human body, possessing characteristics that enable it to bear the body's weight and Transmission it to the lower limbs, as well as support the head, upper limbs, and rib cage. An individual's posture has a clear effect on their ability to communicate with others, and the worse the posture, the greater the effect. Challenge to the stability of the individual's condition. Numerous studies in this field have proven that postural deformities, if not hereditary or pathological, occur as a result of incorrect habits of stillness and movement, which Prompts to the unbalanced use of the muscles responsible for maintaining posture.

The spine Encompasses of a series of vertebrae arranged vertically, totaling 33 vertebrae. Only 24 of these vertebrae are connected by strong, rigid ligaments, allowing them to move (Collinger, Boninger, & Bruns, 2013). The remaining vertebrae are fused together. The spine is articulated by intervertebral discs and articular processes. A series of ligaments and muscles extending longitudinally along the spine help Sustain its correct position. The spine Corroborate the trunk, but this support is not rigid; vertebrae are connected to each other by intervertebral discs, which act as shock absorbers during walking and jumping (Bye, Harvey, Glinsky, Bolsterlee, & Herbert, 2019). Anatomically, the spine has four curves (anterior and posterior), which are visible from the side. These two curves are called primary curves because they are present in the fetus. There are two forward convex curves in the cervical vertebrae and lumbar vertebrae, called secondary curves because they develop after birth. (Jayaraman, Thompson, Rymer, & Hornby, 2013)

Good posture plays a Fundamental role in an individual's life, serving as a positive indicator of health and an excellent marker of healthy habits. These habits Comprise proper sleeping posture, the quality of the bed, and the number of hours of sleep (Abdulrazzaq, 2016), a balanced diet, and correct posture while reading, driving, and watching television, in addition to other daily practices. The nature of one's work places daily stress on posture, especially if the work puts pressure on a

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specific part of the body for extended periods throughout the day. For example, the nature of dentistry often requires constant bending, particularly for those working mornings in hospitals or health centers and evenings in private clinics. This can lead to a hunchback, which may not be immediately apparent but will certainly become more Evident in the future and may, in some cases, Findings in permanent mobility impairment. Furthermore, this type of work frequently causes discomfort for dentists, negatively effecting the quality of their work. The aim of this research is to develop a set of rehabilitative exercises designed to correct body deformities and to identify their effectiveness in correcting certain deformities. The physical constitution of the research sample of dentists.

Many researchers have addressed the topic of postural deformities. The study (Ibraheem & Rasheed, 2021) addressed postural problems in women after childbirth, along with the accompanying problems of weight, lack of movement, and mechanical differences, by designing a device to identify postural problems and then designing a rehabilitation program to correct the postural defect resulting from pregnancy. The two researchers selected a group of new mothers aged (24-32) years, numbering (7) women, with a postpartum period of (48-58) days, in addition to the approval of the specialist doctor. The results showed a clear improvement in all the research variables, especially postural.

In the study (Rifaat and Shayal, 2009), the researchers used the experimental method on (12) injured people. The researchers designed a set of rehabilitation exercises to develop the strength and flexibility of the lower back muscles. The exercises continued to be applied for eight weeks with three rehabilitation sessions per week. The researchers concluded that the rehabilitation exercises for the back muscles are beneficial. The researchers also concluded that there was an improved in the strength and flexibility of the lower back muscles.

As for the study (Ming-Huwi Horng, Horng, & Kuok, 2019), Cobb angle was measured through the sum of the angles of inclination of the upper and lower vertebrae by the law of plane geometry. The study included (32) patients with scoliosis who received treatment in the hospital from 2011 to 2016. Cobb angles were measured in them. The findings of measuring the angle of inclination method and the classical method were compared, and the time taken to measure the two groups was recorded respectively using an electronic timer for comparison.

Materials and methods

The researcher used the experimental method as it was Relevant for the nature of the research. A Questionnaire was conducted in the Rusafa district of Baghdad Governorate regarding back pain among dentists during their practice. The Questionnaire included 128 dentists who work long hours, both morning and evening. Forty-one of them reported experiencing back Throughout work. When photographs were taken of 90% of these dentists and Examined using the Kenovea

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software to Quantify spinal deformities based on the difference among these images and typical spinal measurements using Cobb angle, 30% (12 dentists) were found to have curvatures and postural Anatomical variations that were visible in the software but were not apparent to them. However, upon, Further investigation they reported experiencing more back pain than the others. Consequently, the research sample consisted of 12 dentists with an average age of 33.45 years (±3.478), an average height of 169.451 cm (±6.145), and an average of years of service in the same profession. (9.124) years (±4.021), and doctors working in the morning and evening were Filtered with an average of (6.88) working hours, (±1.301).

Spinal Anatomical variation measurements were extracted Consistent with the difference between them and the typical spinal measurements according to the COBB Angle (Suwannarat, Wattanapan, & Wiyanad, 2017). The researcher used photography to photograph the research sample and then used a computer to Pinpoint the specific spinal deformities as follows:

The person stands in a normal, non-tense position with their left shoulder facing the wall and bare from the top down. The researcher then takes a picture of them, and the picture is Converted to the computer and the required measurements are taken using the Kenovea program, which is a program Focusing on the mechanical analysis of athletic movements and the extraction of distances and angles.

First measurement: Quantifying the distance of deviation from the line connecting the beginning of the cervical curve at the first cervical vertebra and the end of the curve at the fifth lumbar vertebra.

Second measurement: Quantifying the angle of curvature and the sum of the angles of superior and posterior concavity of the spine and the forward curvature of the lower vertebrae.

Corrective rehabilitation exercises: After interviewing the research sample and explaining the research objectives and the method for solving its problem, the researcher Demonstrated the details of the rehabilitation program. After Quantifying the days on which the sample members would perform the rehabilitation exercises, it was Corroborates that the steps for Executing the program would be as follows:

Weeks 1 and 2: Number of units used: Three corrective rehabilitation units per week, each lasting 15 minutes. These Incorporate five minutes of warm-up exercises to prepare the body's muscles. The core of this study consists of breathing exercises aimed at enhancing strength and flexibility of the chest wall muscles, along with exercises to tighten the muscles working on the spine.

Weeks three and four: Number of units used: Three units per week, 25 minutes each, including some warm-up exercises to Formulate the body's muscles for five minutes. The main part includes breathing exercises followed by special exercises for the back muscles, working to enhance and tighten them.

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Weeks five and six: Number of units used: Three corrective and formative rehabilitation units per week, with a time of 30 minutes.

It Comprises performing some warm-up exercises to prepare the body's muscles for five minutes, subsequently succeeded by the main part, breathing exercises, and special exercises that work to tighten the back muscles and stretch the chest cage muscles.

Weeks seven and eight: Number of units used: Three Formative and prescriptive rehabilitation units per week.

The 45-minute program includes five minutes of warm-up exercises to prepare the body's muscles, followed by the main part which includes breathing exercises, and then special exercises for the back and chest muscles using some tools.

Weeks nine and ten: Number of units used: Three corrective and formative rehabilitation units per week.

The 45-minute program includes five minutes of warm-up exercises to prepare the body's muscles, followed by the main part which Is composed of breathing exercises to increase vital ability, and then special exercises for the back and chest muscles with Elevated intensity.

Note: The rehabilitation program focused on the principle of gradual progression, starting with simple muscle-strengthening exercises in the first weeks (15 minutes) and progressing to complex exercises with increased intensity in the last weeks (45 minutes).

The rehabilitation units were Segmented into three days of the week, including the days when there were fewer clients. The choice of days was left to some members of the sample depending on the availability of each of them, provided that three rehabilitation units were performed distributed over the days of the week. The members of the sample were also asked to perform some home exercises, including lying on the ground with complete relaxation for 5 minutes on a flat ground.

Results

Table 1. Descriptive statistical analysis for the pre- and post-test results

Variable	pre-test		post-test	
	mean	sd	mean	sd
Degree of Cervical Lordosis	7.8692	2.14992	4.2267	0.48970
Hyperkyphosis	14.5375	1.92438	8.5417	0.74524
Lumbar Lordosis	7.4158	1.58468	4.0050	0.78040
Cervical Lordosis Angle	41.2500	3.54516	26.6667	4.07505
Thoracic Kyphosis Angle	30.9167	4.88892	22.3333	1.82574
Lumbar Lordosis Angle	18.9167	2.64432	13.3333	1.66969

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Table 2. Differences between the pre-test and post-test for the research sample

Variable	Differences	Sig.	Significance
Degree of Cervical Lordosis	6.035	0.000	Significant
Hyperkyphosis	8.722	0.000	Significant
Lumbar Lordosis	7.350	0.000	Significant
Cervical Lordosis Angle	8.562	0.000	Significant
Thoracic Kyphosis Angle	5.454	0.000	Significant
Lumbar Lordosis Angle	6.881	0.000	Significant

Discussion

From Monitoring the findings above, we find that all significance values (Sig.) are. The results were less than the significant level (0.05), indicating a statistically significant difference between the pre-test and post-test results. The researcher Characteristics these statistically significant differences in the research sample to the researcher's precise scientific Examination in diagnosing the function of the muscles responsible for causing spinal deformities. This Examination targeted these muscles with Centered exercises specific to this area, which is heavily effected by prolonged work. The rehabilitative exercises enhance by the researcher played a significant and important role in relaxing the tense muscles and strengthening the muscles that work to restore the spine to its natural position. Rehabilitative exercises "work to reorganize the function of Specific organs and systems that have been destroyed during work or injury by restoring the automatic function of internal organs and regulating neuromuscular activity to align with the body's functional capacity." Khalil (2008) states that "therapeutic exercises are specific movements for medical conditions with a therapeutic purpose to restore the body to its natural state, utilizing the fundamental principles of motor work that Impacts the response of muscles and nerves through selection." The movements and positions are suitable for the body, and the researcher attributes the results achieved to stretching exercises, which are beneficial and necessary to restore the muscle to its normal length (Hameed & Alta, 2019). The rehabilitation exercises that were Implemented to the doctors in the research sample included elements of strength, flexibility and coordination, which helped to rehabilitate the muscles working on the thoracic, cervical and sacral vertebrae. Ghafel, 2020, indicates that “exercises that work to improve muscle strength work at the same time, to a partial extent, to Optimize postural deviations and deformities when strength exercises are accompanied by flexibility exercises in the muscles.”

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Conclusions

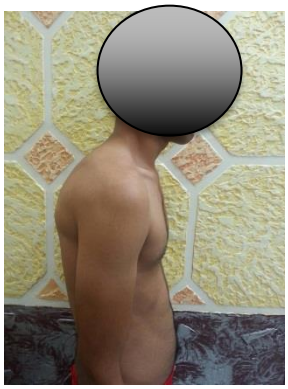
Continuous work can lead to physical deformities,specifically spinal deformities. - Working in a profession like dentistry affects the spine and can cause deformities.

- Corrective and rehabilitative exercises are very crucial for those in professions such as dentists, especially those who work long hours standing throughout the week.

Appendix (1)

Showing the Correct Standing Position and the Procedure for Measuring Spinal Curvatures Using an Inclinometer and the Kinovea Software.



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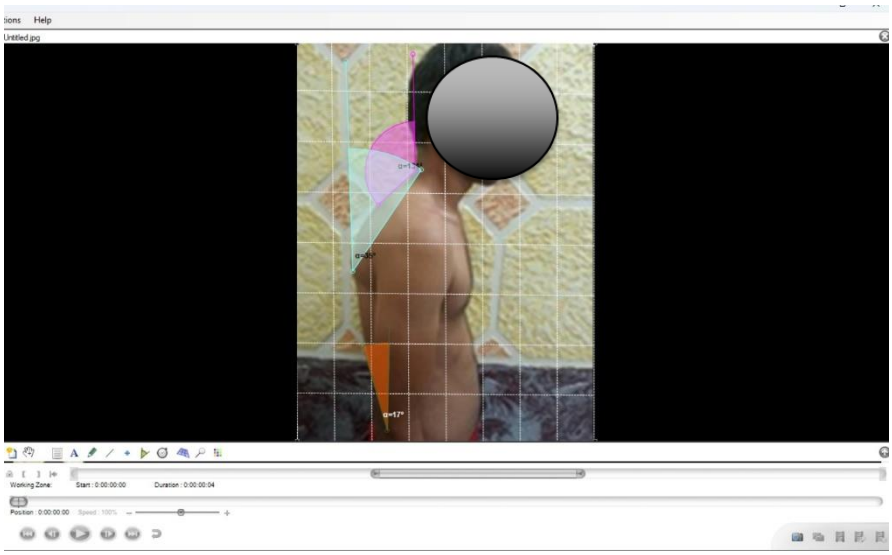

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Appendix (2)

Elucidate Types of Rehabilitation Exercises

The researcher Categorized rehabilitation exercises into three main groups targeting the muscles acting on the spine:
Breathing exercises (to Augment vital capacity and expand the chest), including:
- Thoracic expansion exercise: Inhale deeply while raising the arms high to the sides, then exhale slowly while lowering them.
- Deep breathing exercise while lying on your back with your hands on your rib cage and focus on expanding your ribs while inhaling.
Stretching exercises (to treat tight muscles), including:
- Chest muscle stretch: Stand next to a wall and place your forearms on it while twisting your body in the opposite direction to stretch the anterior chest muscles affected by curvature.
- Cat-Cow stretch: To work on the flexibility of the entire spine and reduce kyphosis.
Strengthening exercises (to treat muscle weakness in the back), including:
-Standing "Y-W" exercise: Move your arms to trace the letter Y, then W, to strengthen the erector spinae muscles and the muscles between the shoulder blades. - Back muscle strengthening exercise: Lie on your stomach and raise your chest and arms slightly to strengthen your lower back muscles.

Appendix (3)

Shows a Model of a Rehabilitation Unit

ت	section	Tim	the details	Notes
1	Preparatory Section	5 minutes	Warm-up and body preparation with walking exercises in place and moving the legs and arms, followed by light exercises such as neck and shoulder rotations.	to prepare the body well.
2	Main Section	10 minutes 20 minutes	We begin with deep breathing exercises to relax the chest muscles and increase Paramount capacity. This is followed by stretching exercises for the chest and back muscles, and strength training exercises for the opposing muscles using body weight or assistive devices such as walls, doors, wooden sticks, and resistance bands.	Pay attention to the adductor muscles, reducing their tension, and the extensor muscles, strengthening them
3		10 minutes	Light stretching exercises with relaxation, performed lying on a flat surface or sitting in a chair with the back flat	The focus is on calming down, relaxing, and ensuring the back remains straight

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The program units included:

- Number of exercises: 6 to 8 varied exercises per unit.
- Number of sets: 3 sets per exercise.
- Repetitions: Strength exercises: 10-12 repetitions.
Stretching exercises: Hold for 20-30 seconds.
- Rest periods: 30-45 seconds between sets to prevent excessive eye strain.

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