

The effect of qualifying exercises using a foam roller on the deviation of back kyphosis and its relationship to the rotation of the shoulders and some physical variables for schoolgirls (9: 12) years old

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Abstract :-

The aim of the study was to show the effect of foam roller exercises on the deviation of back curvature among the female students. The researcher chose students from the age stage 9-12 years of , Cambridge Language School in Sadat City, the academic season 18/2019, with severe kyphosis deviation. Method: The researcher used the experimental method, through the experimental design of the measurement (pre- and post-test) for one experimental group, due to its relevance to the nature of the research application and its procedures. Results: The proposed rehabilitation program using a foam roller for the research sample led to a positive improvement in the Kyphosis deviation and the rotation of the shoulders, and the physical variables flexibility, ability, speed and agility, with statistically significant differences at the 0.05 level in the dimensional measurement. The program led to a decrease in the increase in Kyphosis with a positive improvement approaching the natural convexity of good posture at a rate of (3.82%), and the rotation of the shoulders by (50.0%) and an improvement in the selected physical elements in the research experiment ranged between (10, 23 _ 43.61%).

Keywords: foam roller, deviation of back kyphosis, rotation of the shoulders, schoolgirls.

Introduction and research problem:-

A healthy body has become a necessary requirement nowadays. It is the appearance that indicates the general condition of people and one of the indicators of the health status, as its basis is the construction of the body, the physical structure and consistency between the different parts of the body and through the texture it is possible to identify the degree of growth Human . (17:5).

Since the healthy environment is one of the most important factors of health for the individual, whether in childhood or youth, an unhealthy

environment may lead to the spread of some diseases, including diseases of the spine and deformities of body. (5: 162).

Among the problems that students face in the physical aspects are physiological deviations, as good posture has its effects on individuals in terms of health. As it helps internal vital organs such as the heart, lungs, liver, stomach and intestines and the kidneys to perform their functions efficiently due to their presence in their natural position, , in addition to the delay in the appearance of fatigue in the individual, as the proper position of

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any motor performance reduces the effort and energy expended. (35:200).

Abbas Al-Ramli and others add that good posture is characterized by the presence of every part of the body in a natural position consistent with the other anatomically recognized part, so that the muscles make the least effort to maintain a good postures . And that there is no certain criterion for determining normal and abnormal physiques. **Hayat Ayyad and Safaa al-Kharbutli** indicate that moderate posture is one in which there is a constant balance between muscular strength and gravity, and the arrangement of muscles and bones is in a natural position so that it preserves the natural curves of the body without any increase or decrease. The natural curves of the body or any abnormal shape of any part of the body and the appearance of this lack of balance (12:78).

On this basis, we find that moderate figure depends on the condition of the bones, muscles and ligaments. If these muscles weaken, the balance will be disturbed and the shape of the natural curves will change, which leads to the emergence of postural deviations. The seriousness of postural deviations is not It stops at the limits of affecting the place of the deviation, but goes beyond that, affecting other parts of the body, in addition to the appearance of different pains in the joints. (8:52).

Also, **Hayat Ayyad and Safaa al-Kharbutli** (2) mention that the backbone is considered a mechanical engineering piece and is the support axis for all parts of the body. Curvature

of the back is one of the common deviations of the spine, which can appear in any period of life in childhood, adolescence, youth or in the elderly, and affects other parts of the body and can lead to a rotation of the shoulders or head falling forward or even straightening of the lumbar region.

And **Safaa Al-Kharbutli (2000)** indicates that the study of the stature of individuals is of great importance, as it reflects the state of physical growth and health level. The body is considered an indicator of the health status of the individuals. Thus, the person with the wrong posture is more likely to suffer from pain and many forms of discomfort and vice versa. Whenever the body is correct and free of any deviations or errors, he will be far from any of these problems. The importance of maintaining proper posture increases as the individual advances in age and his muscles become more inclined to loosen and slouch and take the wrong posture. (9: 315).

And since the humpback is an increase in the upper back curvature as a result of weak back muscles, especially in girls at the beginning of puberty for various reasons, including shame about some physiological and morphological changes in the body, as well as wrong habits while sitting for long periods to study, and bad use of technological devices such as computers And the mobile phone, which drew the attention of the researcher through her experiences as a body instructor in the Department of Sports Health Sciences, in addition to

the reference survey that shows the prevalence of this morphological deviation at this stage, which was an impetus to study this problem and work on planning a proposed rehabilitation program for the treatment of back curvature through increasing the flexibility of the spine, and strengthening and lengthening the muscles of the upper back region using the foam roller and present it to those in charge of the physical education program prepared by the Ministry of Education. In addition to realize the relationship of back curvature to the rotation of the shoulders and some of the Physical aspects of female students in the age group of 9-12 years.

Research importance:-

The importance of the research and the need for it lies in the following:

* Shed light on the wrong habits of schoolgirls in the age group of 9-12 years, which cause deviations in morphology, especially hunched back.

* Using easy-to-use foam roller exercises to treat and reduce kyphosis for girls in puberty.

*The proposed program may help in the treatment of back curvature, which reflects positively on the motor and physical performance of the students of this stage.

Research aims:

The research aims to design a rehabilitation exercise program using a foam roller to identify :

1-The effect of foam roller exercises on the deviation of back curvature among the female students, the research sample.

2-The relationship between the deviation of back hump and the

rotation of the shoulders and some physical variables among the female students in the research sample.

3-The percentages of improvement in the skewness of the back curvature and the rotation of the shoulders, and some physical variables among the female students in the research sample.

Research hypotheses:

1-There are statistically significant differences between the two measurements (before and after) in the deviation of back curvature, shoulder rotation and some physical variables among the female students in the research sample in favor of the dimensional measurement.

2-There is a statistically significant correlation between the deviation of back curvature and the rotation of the shoulders and some physical variables among the female students in the research sample.

3-There are percentages of improvement in the dimensional measurement as a result of the effect of the proposed program on the deviation of back curvature, the rotation of the shoulders, and some physical variables for the students in the research sample.

Search terms:

1- Foam Roller:

It is defined by Harry Beresford (2019) (31): It is a piece of lightweight foam in the form of a cylindrical in different sizes and degrees, and it is a tool to get rid of myofascial pain.

2-Physical variables:

It is defined by Mohamed Abdel Halim and Fouad Tarish (2016); It is those variables that express the physical characteristics associated with

the performance of a part of the body. (19:36).

3- **kyphosis:**

It is an abnormal increase in the back curve of the dorsal region of the spine, which causes the back to turn back and the shoulders to rotate and rotate, and the head to withdraw forward (8: 67)

Previous studies:

1-The study of **Abdel Halim Okasha and Ashraf Abdel Qader (2021) (13)** entitled the effect of using foam rollers on some physical variables of junior swimmers, on a sample of (32) swimmers, who were divided into two groups (experimental and control) of each group (12) A swimmer, and the results of the study indicated that the use of foam rolling improved some physical variables (flexibility, agility, strength, speed) for junior swimmers.

2-The study of **Rasha Hamed, Muntaha Mukhlif (2018) (3)**, entitled The effect of foam rolling exercises on the kinetic range of muscle elasticity for women aged 30-35 years, and it aimed to prepare exercises using a tool (foam roller) and then identify the effect of these exercises on The kinetic range of working muscles elasticity, the study sample (12) joint and at a rate of (35%) of the total community, the results are that the stretching exercises using foam rolling positively affected the elasticity of the working muscles and the kinetic range of the experimental group, better than the usual stretching exercises without the foam roller the control group.

3-The study of **Naglaa Al-Badri (2018) (24)**, entitled the effect of flexibility training with resistances (Ki-

Hara) accompanied by a foam roller on some physical variables and the digital level of the 100m hurdles competition, on a sample of (10) female 100m runners Barriers, and the results indicated that there were statistically significant differences between the two measurements before and after the experimental group in shoulder flexibility flexion, shoulder flexibility extension, flexibility of the spine flexion, flexibility of the spine extension, flexibility of the knee flexion, flexibility of the foot flexion, flexibility of the foot extension, acceleration time (10m), reaction time in favor of the dimensional measurement, and the improvement rates ranged between 0.13% for the numerical level variable of sprinting 100m hurdles as a minimum to 28.79% for the flexible spine variable as a maximum.

4- The study of Gregory Percy and David J. Bradbury (2015) (30), entitled Foam Rolling For Delayed onset muscle soreness and recovery of Dynamic Performance measures in order to study the effects of foam rolling in the form of a recovery tool after an intense exercise protocol by evaluating pressure pain, running time, change of direction, speed, strength and dynamic endurance of force, the sample was 8 individuals and used the experimental method, and the results came that the use of foam roller effectively reduced the appearance of muscle pain in most of the measures dynamic performance.

5- The study of **Kellie c. Healey, Dis I. Hatfield, & Deborah Riebe (2014) (33)**, entitled The effects of myofascial

release with foam rolling on performance in order to determine the effect of using Foam Rolling in myofascial release on performance, the sample (26) divided (13 men) (13 women) healthy individuals in young age, and the most important results were that the fatigue after exercising after the Foam Rolling exercise was much less than the fatigue after the performance using Planks and reduced fatigue may allow participants to extend the time and the amount of exercise, which can lead to improvements in performance.

6-The study of **Muhammad Mustafa (2009) (22)**, entitled the effect of deviation degrees (shoulders rotation - back curvature) on some functional variables of the respiratory circulatory system for secondary school students, with the aim of identifying the functional effects of the circulatory and respiratory system associated with the deviation of back curvature and shoulder rotation for secondary stage students., the study sample (50) students from the secondary stage, the results of the humpback deviation is the most effective deviation on the efficiency of physical work and the maximum consumption of oxygen.

7-The study of **Radwan Muhammad (2001) (6)** entitled the effect of a proposed training program for therapeutic exercises on modifying the dorsal curvature and some of the accompanying variables for the age group (12-15) years, on a sample of (20) students suffering from back curvature, and the results indicated the positive effect of the proposed training program on reducing the degree of

dorsal curvature and on some variables such as vital capacity, muscle temperature, grip strength and back muscle strength.

Search procedures:

Research Methodology:

The researcher used the experimental method, through the experimental design of the measurement (pre- and post-test) for one experimental group, due to its relevance to the nature of the research application and its procedures.

Research sample community:

The research community is represented by the students of Cambridge Language School in Sadat City, the academic season 18/2019, and the research sample was chosen in a deliberate way from the students in the age stage from 9-12 years with increased dorsal curvature deviation, and the basic sample was (20) students, and the researcher chose (20) students from the same age group in the school, and from outside the basic sample to conduct the survey studies.

Reasons for choosing the sample:

*The presence of a large number of students with hunched back of this age group in the school of the research community.

*Availability of the personal desire of the students in the research sample to implement the program.

*The selected sample shall not be subject to other rehabilitation programs or use any therapeutic drugs during the proposed program.

*Regularity in the proposed rehabilitation program throughout the trial period.

The homogeneity of the research sample:

The researcher made homogeneity for the female students in the research sample in the two groups (experimental - exploratory), which

numbered 40 students in the variables of growth rates (age, height, weight), diagonal measurements of back curvature and shoulder rotation, and some physical variables, which are shown in Table (1)

Table (1)

The homogeneity of the research sample (exploratory and experimental) in the variables of growth rates and measurements of the diagonal curvature of the back, the rotation of the shoulders and some physical variables (N = 40)

Variables	Tests	measuring unit	arithmetic average	Moderator	standard deviation	Skewness
Growth rates	Age	Year	11,7	11,1	1,43	1,26
	Length	Cm	142,24	141,00	3,52	1,06
	the weight	Kg	42,10	43,00	2,67	1,01-
Kyphosis	Flexible Metal Tape	Degree	146,6	147,5	3,8	0,71-
shoulder rotation	Body analysis program	Degree	5,80	6,00	0,31	1,94-
trunk flexibility	Bend the trunk from standing	Cm	7,34	7,20	1,08	0,39
shoulder flexibility	The numbered stick of raising the arms in front of the top	Cm	14,66	14,5	1,74	0,28
kinetic flexibility	Touch front, bottom and sides with hands	number	26,36	26,25	1,79	0,18
Ability	vertical jump	Cm	4,30	4,20	0,32	0,94
kinetic balance	Plus rate	Cm	73,68	74,10	2,2	0,57-
the speed	Running (20m)	Second	6,46	6,32	1,21	0,35
Agility	Barrow	Second	5,32	5,55	1,42	0,49-

It is clear from Table (1) that the values of the torsion coefficients of the research sample in the two groups (the exploratory-experimental) in the variables of growth rates,

measurements of the skewness of back hump and the rotation of the shoulders and tests of some physical variables for the students in the research sample ranged between (-1.94: 1.26) , where

it was limited to (± 3), which indicates the moderation of the data distribution of the research sample in the selected variables.

Data collection methods and tools:

The researcher used the means, tools and devices for data collection to carry out her research procedures on the specialized scientific references, the reference survey of previous studies, and websites (2), (3), (6), (8), (13), (16), (24), (26), (30), (36), in order to determine the research variables, devices and tools, measurements and tests, and foam roller exercises appropriate for the research sample.

Tools and devices used in the research:

The researcher used the following tools and devices:

- Calibrated medical scale - for measuring body weight
- Rastamer device - to measure the height of the body from the ground.
- Body analysis program: It is a program that is run on a computer to analyze the two-dimensional images of the front and side positions to determine the degree of texture deviations (16: 97).
- -Flexible metal tape: It is a plastic-coated lead tape that is formed in any position while maintaining this shape, and is used to determine the curvatures of the spine of the subject, (21)
- Foam Rolle (20) cylinder.

Measurements and tests used in the research: Attachment (2)

- kyphosis: the flexible metal band (21) .

- Shoulder rotation: body analysis program (16) .
- Trunk flexibility: the trunk flexion test from standing (14) .
- Shoulder flexibility: the numbered stick test by raising the arms in front higher (14) .
- Mobility flexibility: the test of touch in front, down and on both sides with the hands (30) .
- Ability: Vertical jump test (14).
- kinetic balance : plus modified test (24)
- Speed: 20-meter running test (14)
- Agility: Barrow Test (1).

The survey study :

The researcher do the survey study from 3/6 to 12/3/2019 on the research sample of (20) female students. It aimed to achieve the basic requirements of the research procedures as follows:

- Testing the tools and devices used to make measurements of morphological and physical deviations to ensure their validity and efficiency.
- Training the assistants on methods of measurement and recording the data, as well as the method of dealing with the foam cylinder.
- Develop a plan for conducting measurements and tests, arranging them and the appropriate time for their implementation.
- Calculating the scientific coefficients of the tests (validity - reliability) used in the research.

Scientific coefficients for Tests:

The researcher calculated the scientific coefficients as follows:

1- Honesty :

The researcher used the validity of the differentiation by calculating the differences between the upper spring and the lower spring, and the (t) value

on the research sample of (20) female students to measure the kyphosis of the back and rotation of the shoulders on 6& 7/3/2019 as shown in Table (2)

Table (2)

The significance of the differences between the highest spring and the lowest spring in the measurements of kyphosis and rotation shoulders, and some physical variables for the female students in the research sample (n = 20)

Variables	Tests	measuring unit	Upper spring		Lower spring		The difference	value of "t"
			arithmetic average	standard deviation	arithmetic average	standard deviation		
Kyphosis	Flexible Metal Tape	Degree	147,7	3,12	145,3	3,18	2,4	*6,83
shoulder rotation	Body analysis program	Degree	5,2	0,36	6,4	0,39	1,2-	*5,20
trunk flexibility	Bend the trunk from standing	Cm	7,11	1,15	6,87	1,12	0,24	*7,52
shoulder flexibility	The numbered stick of raising the arms in front of the top	Cm	14,22	1,84	15,74	1,93	1,52-	*3,92
kinetic flexibility	Touch front, bottom and sides with hands	Number	26,08	1,98	25,01	1,99	1,07	*4,89
Ability	vertical jump	Cm	4,05	0,30	3,22	0,36	0,83	*4,48
kinetic balance	Plus rate	Cm	73,30	2,17	71,15	2,35	2,15	*6,06
the speed	Running (20m)	Second	6,26	1,23	7,86	1,13	1,6-	*4,33
Agility	Barrow	Second	5,02	1,47	6,80	1,56	1,78-	*7,28

* Tabular value of "T" at the level of significance (0.05) = 2,09

It is clear from Table (2) that there are statistically significant differences between the upper spring and the lower spring in the skewness tests of back curvature, shoulder

rotation and some physical variables for the female students in the research sample, where the calculated "t" value was greater than its tabular value at a significant level (0.05), which

Indicates the validity of the tests under study.

2- Stability coefficient:

The researcher used the test application and re-applied it to calculate the stability coefficient on the sample

under the same conditions and instructions, with a difference of (5) days between the first and second applications , and that was in the period from 8/3 2019 until 12/3/2019, as shown in Table (3)

Table (3)

Correlation coefficient between the two applications (first - second) in the measurements of kyphosis and rotation shoulders, and tests of some physical variables for female students in the exploratory research sample (n = 20)

Variables	Tests	measruing unit	first application		second application		correlation coefficient
			arithmetic average	standard deviation	arithmetic average	standard deviation	
Kyphosis	Flexible Metal Tape	Degree	147,9	3,10	147,7	3,09	*0,745
shoulder rotation	Body analysis program	Degree	5,6	0,33	5,5	0,32	*0,837
trunk flexibility	Bend the trunk from standing	Cm	7,22	1,12	7,24	1,11	*0,788
shoulder flexibility	The numbered stick of raising the arms in front of the top	Cm	14,73	1,81	14,70	1,80	*0,941
kinetic flexibility	Touch front, bottom and sides with hands	number	26,36	1,84	26,32	1,82	*0,908
Ability	vertical jump	Cm	4,27	0,31	4,29	0,32	*0,815
kinetic balance	Plus rate	Cm	73,62	2,21	73,64	2,20	*0,912
the speed	Running (20m)	Second	6,40	1,22	6,37	1,23	*0,779
Agility	Barrow	Second	5,21	1,45	5,19	1,42	*0,689

The tabular value of "t" at the level of significance (0.05) = (0.444)*

It is clear from Table (3) that the values of the correlation coefficients are statistically significant at the level

of significance (0.05), which indicates the stability of the tests under study.

Suggested qualification program:

Program objective:

The use of foam roller exercises to improve the deviation of the kyphosis and the rotation of the shoulders, and some physical variables for female students of the age group (9-12) years.

Program purposes:

- Acquisition of the students in the research sample to the correct posture by practicing foam exercises.
- Improving the research sample with healthy habits to maintain the integrity of the physique.
- Improving the deviation of the kyphosis through foam roller exercises and the positive feedback on the shoulders, and some selected physical and kinetic elements.

Program foundations:

Through a reference survey of specialized scientific references, previous studies, the Internet (1), (2), (7), (15), (29), and an opinion poll of

(5) sports health science experts. Attachment (1) It is possible to identify the following bases.

- Verify the health status of the research sample through a comprehensive medical examination in the school health unit.
- Highlighting the success and motivational experiences of the research sample by informing them with the improvement in their case.
- Taking into care the diversification and suspense, and the sequence from easy to difficult in the paragraphs of the program to decrease the boredom among the students in the research sample.
- Choosing female assistants for easily dealing with the research sample students.

The content of the suggested qualification program for foam roller exercises:

program duration "A week"	Number of units	Number of units weekly	Unit time "minutes"	Foam exercise time "minutes"	exercise performance time "seconds"	Break "seconds"
12	36	3	45	20-15	30-20	30

- The exercises in the first and second week are forced with the help of the researcher and his assistants. Voluntary exercises start from the third week to the tenth week, and light resistance is added in the eleventh and twelfth weeks.

- The researcher used (22) exercises performed using a foam roller on the upper back area to improve the deviation of kyphosis for the research sample students during the proposed program attached (3)

Pre-measurements:

The researcher carried out the tribal measurements of the experimental research group using foam roller exercises to determine the degrees of deviation for kyphosis , rotation of the shoulders and the selected physical tests on Wednesday and Thursday 13 and 14/3/2019.

Implementation of the foam roller exercise program:

The Foam Roller exercise program was applied on teh research sample for (12) weeks, from Saturday 16/3/2019 until Tuesday 21/5/2019.

Post-measurements:

The researcher carried out the post-measurements on the research sample on Wednesday and Thursday, 22 and 23/5/2019 with the same pre-measurements procedures and after completing the application of the suggested program.

Statistical treatments used in the research:

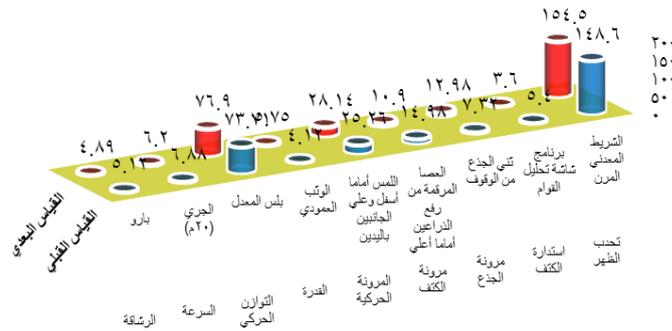
- Arithmetic average
- Standard deviation
- Tests
- Correlation coefficient
- Percentages

Presentation and discussion of the search results:**Firstly: Presentation and discussion of the first hypothesis:****Table (4)**

The significance of the differences between the two measurements (before and after) in the deviation of kyphosis the rotation of the shoulders and some physical variables for the female students in the research sample N = 20

Variables	Tests	measuring unit	Pre-measurements		Post-measurements		value of "T"
			arithmetic average	standard deviation	arithmetic average	standard deviation	
Kyphosis	Flexible Metal Tape	Degree	148,60	3,07	154,50	3,22	*7,93
shoulder rotation	Body analysis program	Degree	5,40	0,30	3,60	0,322	*8,66
trunk flexibility	Bend the trunk from standing	Cm	7,32	1,06	12,98	2,01	*8,73
shoulder flexibility	The numbered stick of raising the arms in front of the top	Cm	14,98	1,71	10,90	1,80	*6,99
kinetic flexibility	Touch front, bottom and sides with hands	Number	25,26	1,71	28,14	1,97	*7,60
Ability	vertical jump	Cm	4,12	0,30	5,75	0,34	*7,52
kinetic balance	Plus rate	Cm	73,71	2,18	76,90	2,26	*6,62
the speed	Running (20m)	Second	6,88	1,22	6,20	1,11	*8,29
Agility	Barrow	Second	5,12	1,37	4,89	1,45	*7,58

Tabular value of "T" at the level of significance (0.05) = 2,09



The differences between the mean of the two measurements (pre and post) in the deviation of back kyphosis and the rotation of the shoulders and some physical variables for the female students in the research sample"

It is clear from Table (4), Figure (1) that there are statistically significant differences between the two measurements (before and after) in the measurements of the skewness of back curvature and the rotation of the shoulders and the tests of some physical variables for the students in the research sample in favor of the dimensional measurement, where the calculated "t" value was greater than The tabular value of "T" at a significant level (0.05), and the results were as follows:

As for the **kyphosis** variable, the average for the pre- measurement with the flexible metal tape reached (148.60) degrees, while the average for the post- measurement was (154.50) degrees, while the average for the pre-measurement for the **shoulder rotation** deviation variable in the degrees of the texture analysis program was (5.40)) degree, and the average

for the post- measurement (3,60) degrees.

As well as in the **physical variables**, the differences between the averages were all statistically significant in favor of the post-measurements. In the **flexibility variable of the trunk**, the average for pre-measurement of the trunk flexion test from standing was (7.32) cm, and the average for the post measurement (12.98) cm, and the pre-measurement of shoulder flexibility in the numbered stick test by raising the arms in front higher (14.98) cm, and the post (10.90) cm.

The pre- for **kinetic flexibility** in the touch test in front, down and on both sides of standing with the hands (25,26) times, and the post (28,14), and pre in the ability in the test of vertical jump (4.12) cm, and the post (5.75) cm, and pre In the **kinetic balance** in the average plus test (73.71) cm, the post (76.90) cm, the pre-**transitional velocity** in the running test (20m) (6.88) seconds, the posterior (6.20) seconds, and the pre in **agility** in Barrow's test (5.12) seconds, and the post-test (4,89).

The researcher attributed the improvement in the degrees of

Kyphosis deviation, shoulder rotation, and the physical elements under discussion to the proposed rehabilitation program, which includes foam roller exercises, which mainly aim to improve the flexibility of the spine and muscular condition, especially the back muscles, and foaming the functional efficiency of many body systems, which in turn is reflected On the kinetic side And the physical in general, as the exercises of the proposed program using the foam roller took into account the condition of the students until they were well adapted to their use, which affected the regularity of the sample members in participating during the experiment, and despite the modernity of this method, it reduced feelings of fatigue and anxiety among the students and contributed to increasing the range of movement (flexibility) they have.

This agrees with what **Vygotsky and others** have indicated by **Andrew D. Vygotsky, Gregory J, Bryan Chung (2015) (26)** and **Naglaa Nouredine (2018) (24)**. This is also supported by **Nawal Shaltout and Safaa Al-Kharbutli (1994) (25)**.

The researcher also attributes the improvement in the selected physical

aspects to the use of body weight based on the foam roller from the movement while performing the exercises in the program, which improves flexibility and thus increases strength for the muscles of the back area and is reflected Turn on the other physical elements.

These results agree with the studies of **Hayley, Elhatfield, Balnebyd, Dorfman, and Kelle c. Healey, Dis l. Hatfield, & Deborah Riebe (2014) (33)**, **Essam Abdel Hamid (2014) (15)**, **Mohamed Abdel-Baqi (2016) (18)**, **Naglaa Al-Badri (2018) (24)**, **Abdel-Wahab Mohamed (2021) (14)**.

Thus, **the first hypothesis of the research**, which states that there are statistically significant differences between the averages of the two measurements (before and after) from the effect of rehabilitation exercises using a foam roller on the deflection of back hump, shoulder rotation and some physical variables for the research sample students in favor of the post-measurement.

Secondly: Presentation and discussion of the results of the second hypothesis:

Table (5)

Correlation coefficient between the deviation of Kyphosis and the rotation of the shoulders and some physical variables for the students in the research sample, N = 20

Variables	Tests	Measuring unit	correlation coefficient
Kyphosis	Flexible Metal Tape	Degree	*0,892
shoulder rotation	Body analysis program	Degree	*0,860
trunk flexibility	Bend the trunk from standing	Cm	*0,598
shoulder flexibility	The numbered stick of raising the arms in front of the top	Cm	*0,565

Follow Table (5)

Correlation coefficient between the deviation of Kyphosis and the rotation of the shoulders and some physical variables for the students in the research sample, N = 20

Variables	Tests	Measuring unit	correlation coefficient
kinetic flexibility	Touch front, bottom and sides with hands	Number	*0,648
Ability	vertical jump	Cm	*0,689
kinetic balance	Plus rate	Cm	*0,643
the speed	Running (20m)	Second	*0,579
Agility	Barrow	Second	*0,609

It is clear from Table (5) that there is a statistically significant correlation at the level of significance (0.05) (its positive, incomplete relationship) between the deviation of Kyphosis and the rotation of the shoulders and some physical variables for the female students from the research sample, where the results came as follows:

As for the shoulders rotated variable, there is a statistically significant correlation at the level of significance (0.05) between the Kyphosis variable and the shoulders rotated variable, which amounted to (0.860)

And a statistically significant correlation at the level of significance (0.05) with an incomplete positive directive relationship between Kyphosis and the selected physical variables reached in the flexibility of the trunk (0.598), and in the flexibility of the shoulder (0.565), and in the mobility of flexibility (0.648), and the ability (0.689), in kinetic balance (0.643), speed (0.579), and agility (0.609).

The researcher attributed the existence of a statistically significant correlation at a significant level (0.05)

between the deviation of the Kyphosis and the rotation of the shoulders to that one of the visible signs of humpback is the weakness and lengthening of the upper dorsal muscles, which is accompanied by the rotation of the shoulders, and an unusual increase in the emergence of the dorsal region outward, with divergence the plank bones, the shortness and strength of the pectoral muscles and the low level of flexibility in this area, which in turn is reflected in most other physical elements, and therefore the improvement in the deviation of the Kyphosis is accompanied by a significant improvement in the rotation of the shoulders, flexibility and lengthening of the pectoral muscles and the strength of the muscles of the upper dorsal region.

This agrees with what was mentioned by **Safaa Al-Kharbutli (2000) and Beth (2011)**. These results agree with the results of the study of **Radwan Muhammad (2001) (6), Rasha Hamed and Muntaha Mikhlif (2018) (3), Abdel Halim Okasha, Ashraf Abdel Qader and others (2021) (13) and Hayat Ayyad and Safaa al-Kharbutli (1995) (2)**

Thus, **the second hypothesis of the research is achieved**, which states that there is a statistically significant correlation between the deviation of Kyphosis and the rotation of the

shoulders and some physical variables among the students in the research sample of (9: 12) years.

Thirdly: Presentation and discussion of the third hypothesis:

Table (6)

The percentages of improvement between the two measurements (before and after) in the Kyphosis deviation, the rotation of the shoulders and some physical variables for the female students in the research sample N = 20

Variables	Tests	Measuring unit	Pre-measurements	Post-measurements	differences between the two measurements	improvement percentage
			arithmetic average	arithmetic average		
Kyphosis	Flexible Metal Tape	Degree	148,60	154,50	5,9	٪3,82
shoulder rotation	Body analysis program	Degree	5,40	3,60	1,8	٪50,00
trunk flexibility	Bend the trunk from standing	Cm	7,32	12,98	5,66	٪43,61
shoulder flexibility	The numbered stick of raising the arms in front of the top	Cm	14,98	10,90	4,08	٪37,43
kinetic flexibility	Touch front, bottom and sides with hands	Number	25,26	28,14	2,88	٪10,23
Ability	vertical jump	Cm	4,12	5,75	1,63	٪28,35
kinetic balance	Plus rate	Cm	73,71	76,90	3,19	٪4,15
the speed	Running (20m)	Second	6,88	6,20	0,68	٪10,97
Agility	Barrow	Second	5,12	4,89	0,23	٪4,70

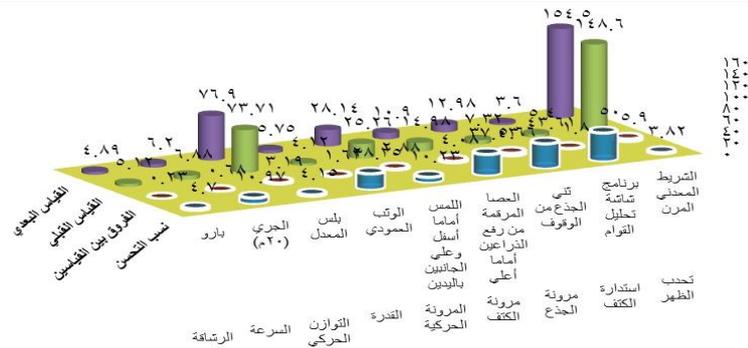


Figure (2)

"The rates of improvement between the two measurements (before and after) in the Kyphosis deviation, the rotation of the shoulders and some physical variables for the students in the research sample"

It is clear from Table (6), Figure (2) that there are percentages of improvement in the post-measurement of the proposed program using Foam Rolling exercises in the Kyphosis, shoulder rotation and some physical variables for the female students in the research sample, where the results came as follows:

The improvement was for the Kyphosis (3.82%), the rotation of the shoulders (50.00%), the flexibility of the trunk (43.61%), the flexibility of the shoulder (37.43%), and the kinematic flexibility (10.23%), and Ability (28.35%), kinematic balance (4.15%), speed (10.97%), agility (4.70%)

The researcher attributes the improvement rates in the post-measurement of the research variables to the exercises of the proposed program using the foam roller, which lasted for (12) weeks with a total of (36) units, by (3) units per week, unit time (45) s, through a variety of exercises for the angles of the spine And the muscles working on it

gradually start with forced and then voluntary exercises from the movement by rolling the body over the tool, then using some light weights with the hands to increase the resistance in the last period of the program to reach the hunching of the back that is closer to normal and thus improving the rotation of the shoulders more as the results of the research indicated in Table (6) as well as in the different physical aspects selected in the research.

This is supported by Nawal Shaltout and Safaa Al-Kharbutli (1994) (25). These results agree with the results of the study by Gregory and David Pearcey, David Bradbury (2015) (30), Ashraf Al-Abbasi (2018) (1), and Abdel-Wahhab Muhammad (2021) (14).

Thus, the third hypothesis, which states that there are percentages of improvement in the post-measurement, is achieved as a result of the effect of the proposed program on Kyphosis deviation, the rotation of the

shoulders, and some physical variables for the female students in the research sample.

Conclusions:

Through the presentation and discussion of the results and within the limits of the research sample, the researcher concluded the following:

- The proposed rehabilitation program using a foam roller for the research sample led to a positive improvement in the Kyphosis deviation and the rotation of the shoulders, and the physical variables flexibility, ability, speed and agility, with statistically significant differences at the 0.05 level in the dimensional measurement.
- There is a statistically significant correlation with an orthodox positive relationship between the research variables Kyphosis , rotating the shoulders, the physical variables in question.
- The proposed preparatory program led to a decrease in the increase in Kyphosis with a positive improvement approaching the natural convexity of good posture at a rate of (3.82%), and the rotation of the shoulders by (50.0%) and an improvement in the selected physical elements in the research experiment ranged between (10, 23 _ 43.61%).

Recommendations:

- The use of foam roller exercises to reduce the rate of Kyphosis deviation and the rotation of the shoulders for schoolgirls at an early age to maintain proper posture.

- Using foam roller exercises to improve the flexibility of the spine and the muscles working on it in the dorsal region and to improve the physical and kinetic aspects associated with it.

- Getting benefits of foam roller exercises to improve and rehabilitate some other deviations of different groups of students.

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