The Effect of Pilates Exercises on the Improvement of Some Variables (Physical - physiological - Bone mineral density) and the Level of Performance Some Athletics Competitions Among 11-12 Year Kids

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Introduction& Problem of Research:

There is no doubt that the interest in kids has become an urgent issue in all sports institutions, as most world's countries directed their research towards that category in order to reveal their physical and skillful abilities, especially as this stage is one of the most important stages of growth on which the next stages depend on, it considered the best stages to develop the kids physical and skillful abilities.

"Mossad Mahmoud Ali" (2018 AD) indicates that: kids should practice the sports activity with fun and pleasure and save atmosphere and safe and healthy environment, provided that they to have proper preparation training before their participation in competitions. (19: 37)

David A. Kelly (2016AD) mentioned that every sports activity is a movement performance, as this performance requires a certain level of physical abilities that vary from akid to another, and here lies the importance of the training programs for kids that are distinguished by easy and medium intensity and has its positive effect an the improvement of physical abilities. (29: 12)

The International Federation of Athletics (2008) indicates that the ideal age to start training on athletics is 10 years, staring with the activities like general training while avoiding high training loads. (4:22)

"Khairya Ibrahim Al-Sukari and Muhammad Jabir Bureqa" (2001 AD) said: kids should participate in the preparatory stage in low-intensity training programs, as most kids don't have the physical and physiological abilities required for high intensity training. (6: 51).

The International Federations of Athletics (2008) states that regular training starts from the age of 10 to 13 with performing part of the basic general training in order to identify the talents based on the principles and scientific methods, In general, the multiple exercises are prepared. (4: 13)

The International Federation of Athletics (2012): indicates that It has become clear after many scientific research and studies in the current situation that the challenge facing the International Federation of Athletics is the formulation of a new concept of athletics, which is uniquely to meet the developmental needs of kids, In the year 2005, The International Federation of Athletics has created a universal athletics policy for joiners from 7 to15 years to provide opportunities for kids in federations

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and other places to prepare for their future in athletics in appropriate and effective ways. (3: 6)

The International Federation of Athletics (2008) quoting Gorizma suggests that the basic training should be from (11-13) years and structural training from (14-16) year, with specialized training starting from 17 years. (4:15)

Radu Teodorescu, Scott B. Lancaster (2008) says: The Sports Training Program for kids from 10to12 years old should include variety of "non-traditional" kinetic activities it varying movement challenges with low and medium intensity, this leads to improve physical and motor abilities. (38: 87)

The International Federation of Athletics (2008) mention from Dempster, S (2005) says that the training programs for the training age (8to12) years are (zero) are characterized by comprehensive and general development of the fundamentals of athletics sport (agility, balance, compatibility and speed) in addition to including sports competition of running, jumping and throwing and dealing with body weight to develop strength and Swiss ball, in addition to modified small games competitions. (4: 11)

"Mohammed Jaber Bureqa and Khairya Ibrahim Al-Sukary" 2018, Don-Marie Lecce, Brett Hurd and Celeste Corey (2014) agree with Colleen Craig (2001) that Pilates exercises on the mattress or using Swiss ball, are one of the best exercises that work for stimulating the physical fitness and improveing the strength, muscle tone and flexibility of kids', as well as the development of balance and neuromuscular compatibility. (14: 9), (30: 39), (28: 74)

Tom Baranowski et al. (2005), "Rael Lycia Kotz and Karen Kalpnger Rael Isacowitz, Karen Clippinger" (2010), "Nesma Mohamed Farag" (2018) thinks that: "Pilates exercises are one of the best exercises which are suitable for kids they , do not care of about the level of fitness or training age and health case and practice of these exercise lead to improve muscle strength especially muscles which support spine, flexibility, muscle compatibility and improving function of heart and lung function, that is because of rhythmic breathing which leads to improve the flow of oxygen in various tissues in body and get the fit body . (44:23), (39: 86), (23: 26 -30)

The International Federations of Athletics (2008) quoted from Wilmer and Costell, D. (2004) that the best age to develop the shin strength is 11-12 years, as well as at this age the performance of kids improves in the endurance while continuing to exercise aerobic exercises. (4: 9)

Janette A. Simmons and Austin C. Brown (2013) see that Pilates exercises have a great place among other exercises because they have many advantages for their practitioners that lead to increase heart and lung efficiency .therefore impairing level of endurance in addition to increasing tone muscle and strength and distinct strength with speed in legs, agility, moving speed, muscular power and endurance. (36: 44)

From the previous presentation, it is clear that the importance of Pilates exercises for kids' and their convenience with the nature of the training programs for the age of (11-12), which were refered to by the International Federation of Athletics in 2008, and through the interest of the researcher and his reading and reviewing of the previous studies and research of Pilates exercises he found that they give no

interest to the kids , however because of the kids need for new training methods to provide their a kind of suspense for the exercise of athletics and increase motivation, which lead the researcher to suggest a training program using the Pilates Exercises through which he could know the extent of the effect of some variables (physical - physiological - bone mineral density) and the level of performance of some athletics competitions among 11-12 year kids'.

Aim of the Research

Improving the performance level of the athletics competitions among 11-12 year kids' under study is through the use of Pilates Exercises and the study its effect on:

- (Physical - physiological - bone mineral density) variables under study.
- The level of performance of athletics competitions among 11-12 year kids' under study.
- Ratio of change in (physical - physiological - bone mineral density) variables under study.
- Ratio of change in the level of performance of athletics competitions among 11-12 year kids ' under study.

Hypotheses of Research

To guide action to the research procedures and to achieve its objectives, the researcher assumed the following:

- There are statistically significant differences between the average of the pre and post measurements in some (physical - physiological - bone mineral density) variables in favor of the post measurement.
- There are statistically significant differences between the average of the pre and the post measurement in the level of performance of athletics competitions among 11-12 year kids' under study in favor of the post measurement.
- There are change ratios in some (physical - physiological - bone mineral density) variables and the level of performance of some athletics competitions among 11-12 year kids 'in favor of the post measurement.
- There are change ratios in the level of performance of athletics competitions among 11-12 year kids' under study in favor of the post measurement.

The Definitions of research

Pilates Exercises

Jean Paterson (2009), "Mohammed Jabir Borekqa and Khairya Ibrahim Al-Sukary" 2018: defines them as a group of safe and effective physical exercises accompanied by patterns of breathing designed to improve strength, flexibility, balance and endurance. (35: 45), (14: 9)

Bone mineral density (BMD)

Zan Ferant, Nejc Kozar, Dusanka Micetic-Turk (2014) defines them as the degree of saturation of the mineral area in non-organic mineral salts. The higher the degree of saturation, the smaller the distances and the greater the degree of bone density, and its unit of measurement in gram / cm 2. (46: 8)

Athletics competitions for kids':

The International Federation of Athletics (2012) defines as: Innovative new competitions that enable kids' to discover the basic activities of the "Dash - running endurance - jumping - throwing - pushing" in any available sports area. (3: 7)

Previous Studies

First: previous studies Arabic

Reham Hamid Abdul-Khaliq (2016) (7) conducted a study entitled "The mutual relationship between mental, physiological and physical condition as a result of Pilates exercises in rhythmic exercises", in order to design a training program using Pilates exercises and know their effects on physical, physiological and self-confidence variables. And the level of performance skill, using the experimental method of a single group, on sample of 16 students, (6) students were selected randomly as a scoping sample and (10) students as an experimental group, and the most important results were that Pilates exercises effect positively on the level of physical and physiological variables under research and self-confidence and the level of the skillful performance.

Midhat Qassem Abdel Razek, Ehab Ahmad Metwally, Hassanein Abdel Hadi Hassanein, Moataz Arafat El Sayed (2015) were conducted entitled “The effects of the use of two types of (free - Pilates) exercise on some physiological and physical variables for the preparatory students stage” in order to identify the effect of using two types of (free - Pilates) exercise on some physiological and physical variables using the experimental method of two groups, which are based on a sample of 16 students, divided into two groups (experimental group of 8 students) and (control group of 8 students) subject to a free training. The most important results were that there are differences improvements in the physiological and physical variables in favor of the experimental research sample.

Second: Previous Foreign Studies:

Fatma ÖZTÜRK, Özhan BAVLI (2017) (34): conducted a study entitled " verify the effect of 8 weeks of Pilates training and aerobic step on the physical performance and self-esteem for females" in order to develop the level of physical performance and the self-appreciation, using the experimental method on a sample of 20 females, and the most important results of Pilates exercises were the positive impact on the level of endurance, mass body index, balance, flexibility, strength and self-confidence.

Taciane Marcondes, Moisés Diego, et all, (2014) conducted a study entitled "Do Pilates Training make change the fitness of young youth of basketball? " to examine the effect of Pilates exercises on the physical fitness, using the experimental method, on sample of 15 young basketball players, the most important results of Pilates exercises were the positive impact on the development of strength and vertical jump.

Research procedures

First: Research Methodology

The researcher used the experimental method with two measures (pre and post measurement) for one experimental group due to its suitability to the nature and objectives of the research.

Second: Research community:

Athletes buds under (12) years registered in Qalubiya area for athletics 2017/2018 season.

Third: Research Sample:

The research sample was selected in a deliberate way from the buds of Banha Sports Club and Banha City Youth Center under (12) years. The sample included (17) kids' and were divided as follows:

• (12) As experimental sample.
• (5) To conduct the survey on them.

Homogeneity of the sample:

In order to ensure that the members of the research sample fell under the normal curve, the researcher conducted homogeneity of the members of the research sample in the measurement of (length - weight - chronological age- Training age) before applying the program as shown in Table (1).

Table (1)
Statistical Characterization of the Search Inclusive Sample of (Height - weight - Chronological age - Training age)
N = (17)

S	Variables	Measuring unit	Arithmetic Mean	Standard Deviation ±	Median	Sprain
1	Length	Centimeter	1.40	0.02	1.39	1.50
2	Weight	Kilogram	36.95	1.72	36.79	0.27
3	Chronological age	Year	11.31	0.15	11.30	0.20
4	Training age	Month	10.23	0.66	10.00	1.04

It is clear from Table (1) that the values of the Sprain coefficients are limited to (0.20: 1.50) and that all of them are between ± 3, indicating that all the subjects have fallen under the average curve in the measurements of (length - weight - Chronological age- Training age), which refers to homogeneity of the research sample.

Table (2)
The Homogeneity of the Total Research Sample in Physical Variables, Bone Mineral Density and the Level of Performance of Athletics Competitions among 11-12 Year Kids under Research
N = (17)

S	Variables	Measuring unit	Arithmetic Mean	Standard Deviation ±	Median	sprain
1	Running in place 15 S	Repetition	19.70	1.15	20.00	0.78 -
2	Burpee (Squat Thrust)		25.88	1.11	25.00	2.37
3	Stand the foot comb on a cube (Right)	Seconds	4.88	0.60	5.00	0.60 -
4	Stand the foot comb on a cube (left)		3.94	0.55	4.00	0.32 -
5	Shuttle Run		11.89	0.13	11.88	0.23
6	Standing Broad Jump	Centimeter	114.64	3.21	115.00	0.33 -
7	Forward Flexion of Trunk		3.23	0.97	3.00	0.71
8	Hand Grip Strength (Right)		20.70	4.13	21.00	0.21 -

9	Hand Grip Strength (left)	Kilogram	16.29	1.26	16.00	0.69
10	Back lift Strength by Dynamometer		47.58	3.98	48.00	0.31 -
11	Leg lift Strength by Dynamometer		59.76	6.32	61.00	0.58 -
12	Bone mineral density " Femur Rotation " BMD.Tro	g /cm 2	0.657	0.01	0.664	2.10 -
13	Bone mineral density "Fe1>mur neck" BMD. F.N		0.740	0.02	0.742	0.30 -
14	Bone mineral density " Lumbar vertebrae " BMD (L2-L4)		0.573	0.01	0.576	0.90 -
15	Harte rate during rest "Auscultation"	Beat per minute	92.70	1.86	93.00	0.48 -
16	Harte rate after activity "Auscultation"		174.05	2.24	175.00	1.27 -
17	Vital capacity	Liter	2.35	0.03	2.37	2.00 -
18	Hurdles race " 40m"	Seconds	11.20	0.15	11.21	0.20 -
19	Teens ' javelin throw	Meter	14.59	0.27	14.54	0.55
20	Short run – up triple jump		6.26	0.11	6.27	0.27 -

Table 2 shows that the values of sprain coefficients for the measurements of (Physical - Physiological - Bone mineral density - the performance level of athletics competitions among 11-12 year kids) are limited to (-2.10: 2.37) and that all are between ± 3, indicating the homogeneity of the members of the research sample and the sample members were under the moderate curve in the variables under research.

Means and tools for data collection:

The researcher used a variety of means to collect data and assist in the implementation of the basic experiment for the research in proportion to the nature of the research and data to be obtained.

Data registration forms

The researcher designed the registration forms for the measurements of the research, so it has the simplicity, ease, accuracy and speed of registration:

- Registration form for buds measurements in (chronological age - length – weight- training age). Annex number (1)
- Registration form for buds measurements in the tests of the (physical abilities, physiological variables and the performance of athletics competitions among 11-12 year kids) under study Annex number (3)

References, Research and Studies Related to Research (Reference Survey):

The researcher conducted a comprehensive reference survey of the scientific references, previous studies and research related to the research topic. The International Information Network and the Academy of Scientific Research and Technology were also used to obtain some foreign studies and articles related to the research topic.

Tools and Devices used in Research:

By reviewing many references and previous studies, the researcher reached to the tools that serve his research and contribute to the completion of the procedures of his research and achieve its objectives:

Used Tools :

- **Mattresses**
- **Swiss balls**
- **Cones**
- **Collars**
- **Ladder of compatibility**
- **Track**
- **Stop Watch**
- **Pilates balls**
- **Video Cutter (Movie maker)**
- **Glue**

- **Step boxes**
- **Dumbles of different weights**
- **The International Federation of kids' athletes (IAAF) bag with all its skills contents under research**

Used Devices:

- **Rasta meter Device for Length Measurement Annex number (13).**
- **Video Camera Sony 25 FPS**
- **Weight Scale to measure the weight.**
- **Dynamometer device model 32526-9 to measure the strength and the muscles of the two legs and back lift.**
- **JAMAR Gauge to measure the Grip strength.**
- **Dry spirometer Device**
- **Pulse measuring device**
- **DEXA Double Emergy X-ray Absorptimetry Norland (2000), located in the Department of Radiology at Banha University Hospitals.**

Application and Personal Interview :

The researcher has designed many survey forms of the opinion of the experts on the following :

- Define the time required to implement the program, the time of the daily training module. Annex number (4)
- Identify the most important physical and physiological abilities of the athletics competitions of the kids under research. Annex number (5)

Table (3)

Percentage of expert opinions to determine the most important physical abilities of children's athletics competitions 11-12 years under research

S	physical abilities	The percentage of agreement	S	physical abilities	The percentage of agreement
1	Speed	100 %	6	Compatibility	70 %
2	Muscle strength	100 %	7	Balance	90 %
3	Flexibility	100 %	8	Accuracy	60 %
4	Agility	100 %	9	Muscular Power	100 %
5	Endurance	70 %	10	Muscular endurance	80 %

Table (3) shows the physical abilities that received 80% or more of the views of the experts

Determining the tests:

After determining the physical abilities of the competitions (under study) by the experts (Annex number 2), the researcher began to list the tests that measure the physical abilities as well as the variables (physiological - bone mineral density) where several tests nominated for each physical ability Appendix (Annex number 6), and several physiological variables and their tests (Annex 6), and determine the best places to illustrate the degree of Great metal density (bone density metals) and its tests through poll Ray of the expert of the sections of orthopedic surgery (Annex 14), and by discussing the contents of the form attached (Annex number. 15) by the experts, and based on what they agreed upon, the tests were nominated as shown in Table (4).

Table (4)

The Tests that Measure the (Physical - Physiological - Bone Mineral Density) variables, the performance level of some athletics competitions among 11-12 year kids' under study Annex number (7)

S	Variables	Measuring unit	The objective of measurement
1	Running in place 15 S	Repetition	Speed
2	Burpee (Squat Thrust)		Muscular endurance of the body General
3	Stand the foot comb on a cube (Right)	Seconds	Balance
4	Stand the foot comb on a cube (left)		
5	Shuttle Run		Agility
6	Standing Broad Jump	Centimeter	Muscular Power
7	Forward Flexion of Trunk		Flexibility of back bones
8	Hand Grip Strength (Right)	Kilogram	The power of the isometric grip
9	Hand Grip Strength (left)		
10	Back lift Strength by Dynamometer		The power of the isometric Back lift
11	Leg lift Strength by Dynamometer		The power of the isometric Leg lift
12	Bone mineral density " Femur Rotation " BMD.Tro	g /cm 2	Bone mineral density
13	Bone mineral density "Femur neck" BMD. F.N		
14	Bone mineral density " Lumbar vertebrae " BMD (L2-L4)		
15	Heart rate during rest "Auscultation"	Beat per 60 s	Efficacy of the heart
16	Heart rate after activity "Auscultation"		
17	Vital capacity	Liter	Efficacy of lungs

Table (4) shows the tests that obtained 80% or more of the views of the experts

Choose the helpers

A number of assistant teachers were employed in the researcher's department, the instructor and the doctor of the club. The researcher explained to them the research objectives and its measurements. The work was determined and distributed to each of them.

Surveys study

The first survey study:

The study was conducted during the period from Wednesday (31/1/2018) until Thursday (1/2/2018) on a sample of (5) of the same research community and outside the basic sample with the aim of the following:

- Conducting experiments on a number of kids for the procedures of measurements by DEXA radiation device on the bone mineral density of the spine and femur to:
  - Ensure the working time of the device and know the time required to conduct the rays of the sample of the research.
  - Facilitate the transfer of the sample and organize and arrange the entry of sample members to the radiology room.

<u>The results of the first surveys conducted by the researcher were:</u>

• Make sure that the rays are safe for the kids.

• Radiation time per person is set at about 20 minutes.

Second survey study:

The researcher conducted this study during the period from Saturday (3/2/2018) until Wednesday (7/2/2018) on a sample of (5) of the same research community and outside the basic sample and applied the specific tests for the following purposes:

- Check the safety of tools and address obstacles, if any.
- Determine the time spent on the exercises under research.

Results of the second survey conducted by the researcher resulted in the following:

- Re-arrange the stations situations inside the playground for easy performance.
- Add (5) minutes to the time of each training.

Pre-measurements:

The pre measurement of the experimental group of the research sample of the weight and height, physical abilities, physiological variables, the level of performance of athletics competitions among 11-12 year kids' are searching were conducted on Friday and Saturday (9-10 / 2/2018) at Benha Sports Stadium (main playground) and measurement of bone mineral density of the spine and femoral spine on Monday and Tuesday (12-13 / 2/2018) at the Department of Radiology at Banha University Hospitals.

Training program:

There is no doubt that the training program is one of the most important means used by the researcher to achieve the objectives of the research that without the program the physical or digital level will not be upgraded, so the researcher took into account the scientific basis and principles of sports training in the preparation of the content of the proposed program.

The basis for the proposed training program is as follows:

- Determining the goal
- Characteristics of the age stage.
- Determine the period in which the training program is applied
- Deter mine the duration of the training program and the total number of training modules.

Objective of the training program:

Improve the level of the performance of athletics competitions among 11-12 year kids' using Pilates exercise.

Components of training load for kids of 11- 12 years:

Abu-Ela Abd El-Fattah (1997) said: The training unit for kids has a degree of difficulty of kinetic performance of (50 – 60 : 70 - 80)% of the maximum limit for the degree of performance difficulty and not to use high intensity in the initial stages to be high intensity of load gradually balanced with the skillful part, and the intervals of rest (30 – 180 seconds) and the performance duration time varies depending on the intensity of the exercise used and the number and training units of (2 - 3) training units per week. (1: 237 - 240)

The International Federation of Athletics (2008) points that it is recommended in the training programs for kids to divide groups of (1- 3) groups, repeating of repeats of (6-15) repetitions, and number and training units of (3-2 days) non-consecutive days per week. (4:16)

Radu Teodorescu, Scott B. Lancaster (2008) state: The children's sports training program (10-12) should be general with low and medium intensity, leading to improve the physical and kinetic abilities of the kids. (38: 87).

Lloyd, RS, Oliver, JL (2012) suggests that when training kids (11: 12) years, training protocols should be used to perform a large number of repetitions in exercise performance (10-18) repetitions and number of training units of (3-2) training units per week. (37:92)

"Medhat Saleh" (2018) states: that in the training of kids performance (1 -3) groups of exercise provides us with the excitement of the training of the and anything more than that is considered a load of the kids and becomes disappointing, and the number of repetitions are of (5- 20) and intervals of rest (30 - 120) seconds. (17: 153)

"Medhat Saleh" (2018) adds: Children respond well to the appropriate program of resistance training when the amount of resistance are (60 - 70) %. (17: 141)

Determination the load degree:

In the light of the above and after taking the consultation of the experts, Appendix Annex number. (4). the degree of the load was determined using the mean load and the load less than the mean table (5) according to the goal of each training unit

Table (5)

Dynamic Formation of Load Training

Relative distribution of training load during the eight training weeks:

S	Level of training load	Medium load	Less than Medium load
1	Intensity	50 – 75 %	30 – 50 %
2	During of exercise	10 – 15 R	15 – 20 R
3	Rest	1:2 M	1 M : 45 S

Table (6)

Determining the application period:

The Intensity of the Training Load During the Eight Training Weeks

First week : The intensity of the load ranged 35 : 40 %

Second week : The intensity of the load ranged 45 : 50 %

Third week : The intensity of the load ranged 50 : 55 %

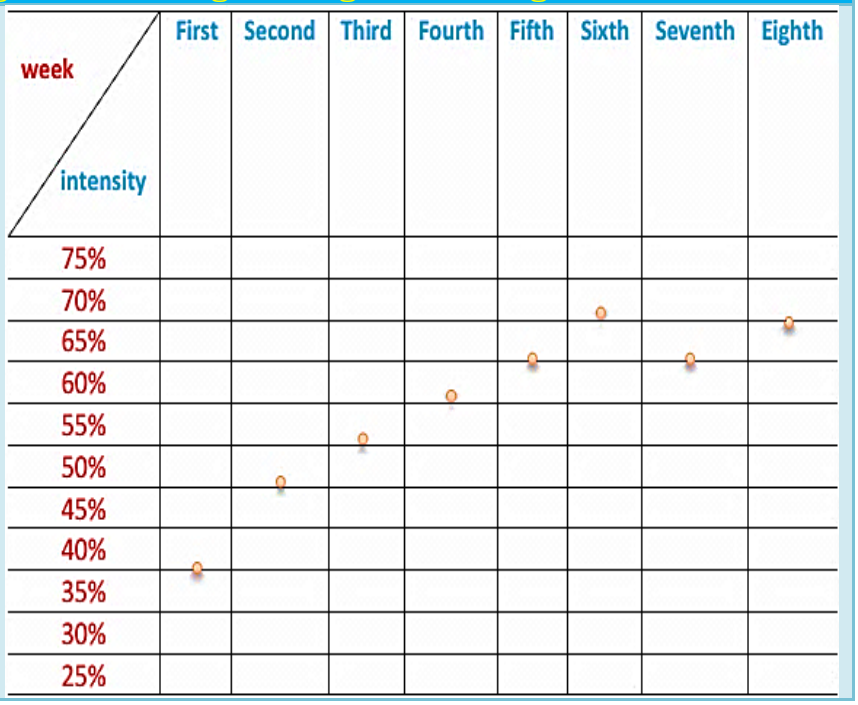
Fourth week : The intensity of the load ranged 55 : 60 %

Fifth week : The intensity of the load ranged 60 : 65 %

Sixth week : The intensity of the load ranged 65 : 70 %

Seventh week : The intensity of the load ranged 60 : 65 %

Eighth week : The intensity of the load ranged 65 : 70 %



The researcher found, through the reference survey of previous studies and scientific references that the sufficient period for the emergence of the effects of Pilates Exercises range between (6:10) weeks.
In the light of the above and after taking the consultation of the experts Appendix Annex number (4) the researcher sees that the period is 8 weeks 3 units per week, 24 units of training is enough to show the physical and physiological effect of the Pilates exercises programs.

Table (7)
Time distribution of the training unit

Part unit	Warm up	The basic part	Cool down	Total
Time per minutes	10 m	70 m	10 m	90 m

The intensity of the load was determined in light of the training time (90) minutes after the consultation of the experts.
Training units parts within the proposed program:

1. Warm-up:

The warm-up included an innovative set of preliminary games, lengthening exercises and running around the playground appendix Annex. (8) With the aim of:

- Raise body temperature and protect against injuries.
- Improve the breathing rate and heart rate.

The International Federations of Athletics (2008) points out that in children's training programs, warm-up time is 5-10 minutes. (4:16)

1. **Main part:**

A) Training of skill preparation and models of the International Federation of Athletics for the preparation of children's competitions (11-12) under research Annex (10)

- Hurdles race " 40m"
- Teens ' javelin throw
- Short run – up triple jump

A- Pilates Training Annex (9)

- On mat
- with Swiss ball
- with Pilates ball
- with dimple

Conclusion

This section contains light running training and some weights and vibrations for the male and female (Annex 11).

The International Federations of Athletics (2008) stated that in the training programs for children, the relaxation training period is after the basic part of the training unit of 5 - 10 seconds. (4:16)

Application of the proposed training program:

The training program Annex (12) and (16) was applied to the research sample starting on Thursday (15/2/2018) until Tuesday (10/4/2018), (8) weeks by (3) units (Thursday, Sunday, Tuesday) at Benha Sports Club on the members of the basic

research sample. The following table shows the general content of the training program.

Table (8)
Schedule the contents of the training program

s	Variable	Distribution time	The percentage of agreement
1	Number of weeks	8 week	100 %
2	The number of training units of week	3 units	
3	Total of training units	24 units	
4	Total of training units time	90 m	80 %
5	Total application of training program per minute	2160 m	
6	Total application of training program per hours	36 h	

Post measurement:

It was conducted the post measurements (physical, physiological, performance level of athletics competitions for kids 11-12 years) under research in Banha Sports club after the end of the program will be held on Thursday and Friday (12-13/4/2018), measuring bone minerals spine density and the thigh bones on Saturday and Sunday (14-15/4/2018) at the Department of Radiology at Banha University Hospitals. The measurement was done with the same devices and tools that were done in the pre measurements, and the standardization of the measurement places, conditions and instructions and by the same assistants.

Statistical Coefficient:

After the data collection of the results of the different measurements of the variables under research were carried out, the statistical treatments were used to achieve the objectives and to confirm the validity of the hypotheses in the Institute of Statistical Studies at the University of Cairo through the statistical program of the statistical package for social sciences, which is symbolized by the code (SPSS) (vergen20) And the researcher has adopted a significant level 0.05 The statistical tests were as follows:

- Arithmetic Mean
- Standard Deviation
- Median
- Sprain
- T test (T) for a one group
- Change percentages

- ***The Results Review & Explanation Discussion:***
- ***Review of the results***

Table (9)

The significance of the differences between the pre measurement and the deviation in the physical variables under research

(N = 12)

Variables	Measuring unit	Pre measurement		Post measurement		Average differences	"T" Value and its significance
		Arithmetic Mean	Standard Deviation ±	Arithmetic Mean	Standard Deviation ±		
Running in place 15 S	Repetition	19.91	1.24	22.66	0.98	2.75	7.02*
Burpee (Squat Thrust)		25.92	1.24	28.83	1.93	2.91	7.70*
Stand the foot comb on a cube (Right)	Seconds	4.66	0.65	6.08	0.51	1.42	7.34*
Stand the foot comb on a cube (left)		3.91	0.51	4.83	0.57	0.92	6.16*
Shuttle Run		11.91	0.15	11.02	0.37	0.89	7.78*
Standing Broad Jump	Centimeter	114.66	3.72	120.91	3.60	6.25	8.22*
Forward Flexion of Trunk		3.25	0.96	4.58	0.99	1.33	9.38*
Hand Grip Strength (Right)	Kilogram	20.58	0.79	26.91	2.02	6.33	14.65*
Hand Grip Strength (left)		16.08	1.16	19.58	1.56	3.50	5.99*
Back lift Strength by Dynamometer		47.83	4.60	56.58	2.23	8.75	5.76*
Leg lift Strength by Dynamometer		59.66	4.37	65.83	4.23	6.17	4.16*

*** (T) Tabular value at level 0.5 and freedom degree 11 = 1.796**

Table (9) shows that there are statistically significant differences between the pre measurement and the post measurement in all the physical variables under research in favor of the post measurement. The calculated value (T) is between (4.16 : 14.65), which is greater than the tabular value Level at 0.05.

Table (10)

Significance of the differences between the pre and post measurement and the deviation in the bone density variables under research

N = (12)

Variables	Measuring unit	Pre measurement		Post measurement		Average differences	"T" Value and its significance
		Arithmetic Mean	Standard Deviation ±	Arithmetic Mean	Standard Deviation ±		
Bone mineral density " Femur Rotation " BMD.Tro	g /cm 2	0.653	0.01	0.749	0.02	0.096	20.18*
Bone mineral density "Femur neck" BMD. F.N		0.737	0.01	0.846	0.01	0.109	27.45*
Bone mineral density " Lumbar vertebrae " BMD (L2-L4)		0.575	0.01	0.684	0.02	0.109	20.59*

*** Tabular value at level 0.5 and freedom degree 11 = 1.796**

Table (10) shows that there are statistically significant differences between the pre and post measurement in all the physical variables under research in favor of the post measurement. The calculated value (T) is between (20.18: 27.45), which is greater than the tabular value Level 0.05.

Table (11)

The significance of the differences between the pre and post measurement in the physiological variables under research

N = (12)

Variables	Measuring unit	Pre measurement		Post measurement		Average differences	"T" Value and its significance
		Arithmetic Mean	Standard Deviation ±	Arithmetic Mean	Standard Deviation ±		
Heart rate during rest "Auscultation"	Beat per minute	91.83	1.99	85.75	3.01	6.08	10.92*
Heart rate after activity "Auscultation"		174.33	1.96	168.91	2.15	5.41	7.09*
Vital capacity	Liter	2.35	0.05	3.21	0.35	0.86	8.68*

*** Tabular value (T)at level 0.5 and freedom degree 11 = 1.796**

Table (11) shows that there are statistically significant differences between the pre and post measurement in all the physical variables under research in favor of the post measurement. The calculated value (T) is between (7.09: 10.92) Level 0.05

Table (12)

The significance of the differences between the pre and post measurement in children's competitions 11-12 years under research.

N = (12)

Variables	Measuring unit	Pre measurement		Post measurement		Average differences	"T" Value and its significance
		Arithmetic Mean	Standard Deviation ±	Arithmetic Mean	Standard Deviation ±		
Hurdles race " 40m"	Seconds	11.24	0.16	10.21	0.11	1.03	18.50*
Teens ' javelin throw	Meter	14.65	0.27	16.10	0.36	1.45	13.89*
Short run – up triple jump		6.24	0.11	6.65	0.23	0.41	6.24*

*** Tab value at level 0.5 and freedom degree 11 = 1.796**

It is clear from Table (12) that there are statistically significant differences between the pre and post measurement in all the physical variables under research in favor of the telemetry. The calculated value (T) is between (6.24: 18.50) Level 0.05.

Table (13)

Percentage of change rate in the physical variables under research

Variables	Measuring unit	Pre measurement	Post measurement	The percentage of Change %
		Arithmetic Mean	Arithmetic Mean	
Running in place 15 S	Repetition	19.91	22.66	13.81
Burpee (Squat Thrust)		25.92	28.83	11.22
Stand the foot comb on a cube (Right)	Seconds	4.66	6.08	30.47
Stand the foot comb on a cube (left)		3.91	4.83	23.52
Shuttle Run		11.91	11.02	7.47
Standing Broad Jump	Centimeter	114.66	120.91	5.45
Forward Flexion of Trunk		3.25	4.58	40.92
Hand Grip Strength (Right)	Kilogram	20.58	26.91	30.75
Hand Grip Strength (left)		16.08	19.58	21.76
Back lift Strength by Dynamometer		47.83	56.58	18.29
Leg lift Strength by Dynamometer		59.66	65.83	10.34

Table (13) shows the differences in the percentage of change between the pre and post measurement of the basic group in the physical variables under research. The highest differences were in the percentage of change in the test of bending the trunk from stand at 40.92%. The lowest differences in the rates of improvement in the wide jump test of stability at 5.45% .

Table (14)

Percentage of change rate in Bone Mineral Density variables under research

Variables	Measuring unit	Pre measurement	Post measurement	The percentage of Change %
		Arithmetic Mean	Arithmetic Mean	
Bone mineral density " Femur Rotation " BMD.Tro	g /cm 2	0.653	0.749	14.70
Bone mineral density "Femur neck" BMD. F.N		0.737	0.846	14.78
Bone mineral density " Lumbar vertebrae " BMD (L2-L4)		0.575	0.684	18.95

Table (14) shows the differences in the percentage of change between the pre and post measurement of the basic group in the bone density variables under study. The highest differences were in the percentage of change in bone mineral density (L2-L4)

BMD (57.14)%. The lowest differences in the rates of improvement in BMD Tro improvement rate at 14.70%.

Table (15)

Percentage of change rate in the physiological variables under research

Variables	Measuring unit	Pre measurement	Post measurement	The percentage of Change %
		Arithmetic Mean	Arithmetic Mean	
Heart rate during rest "Auscultation"	Beat per minute	91.83	85.75	6.62
Heart rate after activity "Auscultation"		174.33	168.91	3.10
Vital capacity	Liter	2.35	3.21	36.59

Table (15) shows the differences in the percentage of change between the pre and post measurement of the basic group in the physical tests under stdy. The highest differences were in the percentage of change in Measure the vital capacity of the lungs was 36.59%. The lowest differences in the rates of improvement in Heart rate after activity measurement effort was 3.10%.

Table (16)

Percentage of the change rate in the athletics competitions among 11-12 year kids under sudy

Variables	Measuring unit	Pre measurement	Post measurement	The percentage of Change %
		Arithmetic Mean	Arithmetic Mean	
Hurdles race " 40m"	Seconds	11.24	10.21	9.16
Teens ' javelin throw	Meter	14.65	16.10	9.89
Short run – up triple jump		6.24	6.65	6.57

Table (16) shows the differences in the percentage of change between the pre and post measurement of the basic group in the physical tests under research. The highest difference was in the percentage of change in the javelin competition for adults which reached 9.89%. The lowest differences in the rates of improvement in the the triple jump from short space was at 6.57%.

The Result Discussion and Explanation:

In the light of the statistical analysis of research data and reliance on scientific references and previous studies, the researcher discussed in this part the results of the research presenting them in tables and commented on them, and clarification of the course of the discussion, the researcher saw that this is done on several axes in line with the hypotheses and results of the research as follows:

Discussing the results to ascertain the validity of the first hypothesis, this states:

"**There are statistically significant differences between the average of the pre and post measurements in some (physical - physiological - bone mineral density) variables in favor of the post measurement"**

It is clear from the results of Table (9) that there are statistically significant differences between the pre and post measurement in all the physical variables under research in favor of the post measurement. The calculated value (t) is between (4.16 and 14.65) (0.05) for the experimental group, where in the Running in place 15 S test, the mean difference between the post and pre measurements was (2.75) while the value of (T) was calculated (7.02), while in the test (Burpee (Squat Thrust)), the total mean difference between the pre and post measurement (2.91) and the value (T) calculated was (7.70).

The test of (Stand the foot comb on a cube "Right") the total average differences between the two pre and post measurements amounted to (1.42) and the value of (T) calculated amounted to (7.34), as well as test (Stand the foot comb on a cube "left") has reached a total average differences between the two pre and post measurements (0.92) and the value of (T) calculated amounted to (6.16), as well as test (Shuttle Run), The total average differences between the two pre and post measurements amounted to (0.89) and the value of (T) calculated amounted to (7.78), and test (Standing Broad Jump), The total average differences between the two pre and post measurements amounted was (6.25) and the value of (T) calculated amounted to (8.22) the test of (Forward Flexion of Trunk) total mean difference between the pre and post measurement (1.33) and the calculated value (t) was 9.38, the test of the(Hand Grip Strength "Right") total mean difference between the pre and post measurement (6.33) and the calculated value (T) was (14.65). The test of the Hand Grip Strength "Left") total mean difference between the pre and post measurement (3.50) and the calculated value (T) was (5.99). in the Back lift Strength by Dynamometer test with the dynamometer the mean differences between the pre and post measurement (8.75) and the calculated value (T) were (5.76), and the test of (Leg lift Strength by Dynamometer) in pre and post-tests (6.17) and the value of (T) calculated amounted to (4.16), and the above shows that there is a positive development has emerged in the significant differences in the results of pre and posttests (experimental group) and in favor of post-tests in all physical tests under study.

The researcher attributed this improvement to Pilates exercises, Pilates exercises with Swiss ball, Pilates exercises with Pilates ball, Pilates exercises with dimple, and the innovative warm-up games selected and selected from Which will improve and develop physical abilities.

Don-Marie Lecce, Bret Hurd, Celeste Corey (2014), and Colleen Craig (2001) agree that Pilates exercises on the mattress or using Swiss Ball balls , considered of the best exercises that improve the strength, muscle tone and flexibility of children, as well as the development of balance and muscular compatibility. (30: 39), (28: 74)

"Muhammad Jaber Bureqa and Khairya Ibrahim Al-Sukari" 2018: Pilates exercises promote physical fitness. It not only achieves miracles for a wide range of people and is practiced at anytime and anywhere. (14: 9)

The results of this study are consistent with the study of Samir Lotfy, Mohammed Salah, and Hind Farouk (2010). (40): The most important results were that the use of Pilates Exercises has a positive impact on improving the physical variables of the sample of research under consideration.

The results of this study are also consistent with the study of Dilek Sevimli, Murat Sanri, 2017 (32): The most important results were the development of physical abilities, the product of Pilates exercises.

The results of the study are also consistent with those of "Yong Seok Jee Gwang-Suk Hyun Jeong-Min Park" (2016)(45) Pilates exercises in all the variables of the study are markedly.

As shown in the results of Table (10) there are statistically significant differences between the pre and post measurement in all bone density variables under research in favor of the post measurement. The calculated value T is between (20.18: 27.45) which is greater than the tabular value (T) at 0.05. In the (Bone mineral density "Femur Rotation" BMD.Tro) the mean difference between the pre and post measurements (0.096) was calculated with the calculated value of (20.18). In the BMD test, (Bone mineral density "Femur neck" BMD. F.N) the mean difference between the pre and post measurements (0.109) and the calculated value (T) was 27.45, and the BMD Vertebral BMD (Bone mineral density " Lumbar vertebrae " BMD "L2-L4") the total average differences between the two pre and post measurements was (0.109), while the value of (T) calculated (20:59).

The researcher attributed this improvement to Pilates mat Exercises and Pilates Exercises with Swiss ball and Pilates Exercises with Pilates ball exercises and Pilates Exercises with dimple and Innovative preliminary games included in the warm-up, and well selected from which will improve bone density development.

"Medhat Saleh" (2018): The results of research indicate that the stage of childhood is the perfect time for bone development, regular participation in resistance training increases the density of bone minerals (BMD). (17: 142 143)

Rael Isacowitz and Karen Clippinger (2010) report that Pilates exercises help increase bone density and skeletal integrity. (39: 9)

The results of this study are consistent with the study of Sohana Khandekar, Shrikant Mhase (2018), (42), and the results of the study of De Oliveira (2018) (31): where the most important results of those studies of Pilates exercises have a positive effect on improving the bone density level of the sample under research.

The results of this study are consistent with the study of Chang Sen, Ji-kum, Jay Sun Kim and Hyo Jin Kim (2014)(27) that the most important results of this study were that the use of Pilates exercises has a positive effect To improve the bone density level of the sample under research.

The results of Table (11) show that there are statistically significant differences between the pre and post measurement in all the physiological variables under research in favor of the post measurement. The calculated value (T) is between (6.18:

22.74) which is greater than the tabular value of (T) at the level of (0.05) that is greater than the significant level 0.05 for the experimental group. In the test of (Heart rate during rest "Auscultation"), the mean difference between the pre and post measurements was (6.08) and the value of calculated (T) was (10.92), while in the test (Heart rate after activity "Auscultation") the total mean difference between the pre and post measurements were (5,41). The mean value of (T) was 7.09, and the test (the vital capacity of the lungs) was the total mean difference between the pre and post measurement was (0.86) and the calculated value (T) was (8.68).

The researcher attributed the improvement in Pilates exercises, Pilates Exercises with Pilates ball, Pilates Exercises with dimple and the selected innovative included in warm-up exercises and selected from the Pilates exercises that will improve the functions of body organs.

This is confirmed by "Nesma Mohamed Farag" (2018): she sees that the Pilates Exercises has many benefits such as improving the process of breathing and blood circulation and physical safety, which is the health situation in general. (23: 26-27)

The results of this study are consistent with the results of the study conducted by Riham Hamed Abdul Khalik (2016)(7). The most important results were that the Pilates training program has a positive impact on the level of physiological variables under research and self-confidence in the level of skill performance.

The results of this study are also consistent with the results of the study conducted by Medhat Kassem Abdel Razek, Ehab Ahmed Metwally, Hassanein Abdel Hadi Hassanein, Moataz Arafat El Sayed (2015) (18). The main results were the improvement differences between the two groups: Physiological and physical variables in favor the sample of experimental research sample (1) that used Pilates exercises.

Based on the mentioned results of the previous studies and reviews of the scientific references that dealt with Pilates exercises, it has been possible for the researcher to confirm the validity of the first hypothesis, which states: **" There are statistically significant differences between the average of the pre and post measurements in some (physical - physiological - bone mineral density) variables in favor of the post measurement" variables for the post measurement"**

Discussing the results to ascertain the validity of the second hypothesis, which states:

" There are statistically significant differences between the average of the pre and the post measurement in the level of performance of athletics competitions among 11-12 year kids' under study in favor of the post measurement "

The results of Table (12) show that there are statistically significant differences between the pre and post measurement in all the physical variables under research in favor of the post measurement. The calculated value (T) is between (18.50: 6.24) which is greater than the tabular value of (T) at the level of (0.05) that is greater than the significant level 0.05 for the experimental group. In the test of (Hurdles race " 40m"), the mean difference between the pre and post measurements was (1.03) and the value of calculated (T) was (18.50), while in the test (Teens ' javelin throw) the

total mean difference between the pre and post measurements Was (1.45) and the value of calculated (T) was (13,89) and in the test of (Short run – up triple jump) the total average differences between the two pre and post measurements (0.41) and the value of (T) calculated amounted to (6.24). The results showed that there was a positive improvement in the differences in the results of the pre and post tests for the experimental group and for the post-measurement in all levels of skilled performance of the Kids competitions 11-12 years. The researcher attributed this improvement and the statistical significance due to the use of selected Pilates exercises that will improve and develop the level of skill performance.

This is consistent with the results of the study conducted by Faten Ismail Mohamed (2016) (12): the results of her study indicated that the use of Pilates training within the training modules of the trainers' training programs because of its positive role on some kinetic variables and accuracy of the skill of overwhelming beating volleyball game.

The results of this study are also consistent with the study of all Taciane Marcondes, Moisés Diego, et all (2014) (43): The results of their study indicated that the most important results of Pilates exercises was that it has positive effect on the development of strength and vertical jump and the level of skill performance.

The results of this study are also consistent with the study of "Aziza Mohammed Hassan Ali" 2013 (10): that the most important results to develop the skill level resulted from the use of Pilates exercises training program.

These results are also consistent with the results of the study of "Ghaida Abdul Shakour Mohammed, Walid Ahmed Gabr" (2009) (11): where the results of their study pointed to the superiority of the experimental group that used exercises Pilates training group on the level of skill performance.

The results of this study are consistent with the study of "Naglaa Salama Mohammed" (2013). (22): where the most important results that the use of Pilates exercises positive impact on improving the level of skill performance.

Jan Paterson (2009) notes that the presence of Pilates exercises in the training programs improves the skill level of the various sports activities. (35: 18)

“Nesma Mohammed Farag" (2018) emphasizes that, where she sees that Pilates Exercises improve performance in practiced sports activity. (23:27)

Based on the results of the previous studies and views of the scientific references that dealt with exercises Pilates, it has been possible for the researcher to confirm the validity of the second hypotheses, which states: **" There are statistically significant differences between the average of the pre and the post measurement in the level of performance of kids' athletics competitions of 11-12 years under research in favor of the post measurement"**

Discussing the results to ascertain the validity of the third hypothesis, which states:

"There are rates of change in some (physical - physiological - bone mineral density) variables and the level of performance of some athletics competitions among 11-12 year kids 'in favor of the post measurement"

Table (13) shows the percentages of change between the pre and post measurement mean of the experimental group in the physical abilities in the table. The table shows the percentages of the rate of change of the mean measurements of pre and post measurements, as follows:

In the "Running in place 15 S" test the percentage of change in the post measurement from the pre measurement reached to 13.81%.

The researcher attributed the improvement to Pilates mat exercises, including exercises (1, 5, 11, 14) and Pilates Exercises with Swiss ball, especially exercises (1, 6) and Pilates exercises with Pilates ball (5, 7, 8), Pilates Exercises with dimple, training exercises (3, 4), and training exercises for the racing of the barriers and the international federation of athletes models for the preparation of the children's barriers race, which in turn led to improve the kinetic speed, the preliminary innovative games included in warm-up, where the performance of those exercises is designed to develop the kinetic speed of the sample under research.

In the test of "Burpee (Squat Thrust)" the percentage change in the post measurement rather than pre measurement to reached (11.22%).

The researcher attributed this improvement to Pilates mat exercises, Pilates exercises with Pilates ball, Pilates exercises with dimple, and innovative training games included in warm-up and exercise (18), as the performance of these exercises aimed at developing muscular endurance of the sample under research.

In the test of "Stand the foot comb on a cube (Right)" the improvement rate in the poet measurement rather than the pre measurement (30.47%), and the test "Stand the foot comb on a cube (left) " reached the rate of change in the post measurement rather than pre measurement to (23.52%).

The researcher attributed this improvement to Pilates mat exercises, Pilates exercises with Pilates ball, Pilates exercises with dimple, and innovative training games included in warm-up and exercise (18), as the performance of these exercises aimed at developing the kinetic balance of the sample under research.

The "shuttle run", which the change rate reached in the post measurement to 7.47% rather than the pre measurement.

The researcher attributed this improvement to Pilates mat Exercises training and specially training No. (6), and Pilates Exercises with Swiss ball and specially training No. (7: 8) and Pilates Exercises with Pilates ball and specially training No (1) Pilates exercises with dimple and specially training number (1, 6, 4) exercises of skill preparation and the International Federation of Athletics models, which in turn led to improve the agility, and the preliminary innovative games included in the warm-up specially number (4, 6, 9, 11, 14, 16), as these exercises were based on their performance on the compatibility between the different body organs.

The "Standing Broad Jump" test, with the percentage of change in telemetry post measurement rather than the pre measurement (5.45%).

The researcher attributed this improvement to Pilates mat Exercises and Pilates Exercises with Swiss ball and Pilates Exercises with Pilates ball exercises and Pilates Exercises with dimple, and the International Athletics Federation of race barriers models and triple jump and preliminary games training are included in the warm-up,

where the performance of these exercises aimed at developing the strength with the speed of the sample under research.

The test of "Forward Flexion of Trunk", which reached the percentage of change in post measurement rather than pre measurement to (40.92) %.

The researcher attributed this improvement to Pilates mat exercises, especially exercises (3, 7, 13, 8), where Alycea Ungaro (2002) states: Pilates exercises on the mattress work to prolong all muscles and increase the body Flexibility of the joints through performance in the full range of movement (24: 61), Pilates exercises with Swiss ball and specially exercises No. (3) Pilates exercises with Pilates ball and specially exercises (3, 4) and Pilates exercises with dimple and specially exercises (2) and the models of the International Federation of Athletics, whose performance depends on the length of the step like the races of the preparation for race barriers and competitions to prepare for the competition included in the triple jump included in the skillful preparation and emphasizes that: "Jehan Hamid Hndouk" (2015) (5): where she thinks that the competitions of kids athletics led to the development of physical abilities, and the preliminary games included in the warm up and especially No. (10), as these exercises were dependent on the performance of the increase of the kinetic range.

The test of "the grip strength" right hand" reached the percentage of improvement in the post measurement rather than pre measurement (30.75%), and in the test" grip strength "left" and reached the rate of change in the post measurement rather than pre measurement (21.76%).

In the test of "Back lift Strength by Dynamometer" the improvement rate in the measurement of the post measurement rather than pre measurement was (18.29)%, and test
"Leg lift Strength by Dynamometer" the change rate in the measurement of the post measurement rather than pre measurement was (10.34)%.

The researcher attributed this improvement to Pilates exercises and Pilates exercises with Swiss ball. This is confirmed by Manal Talaat Mohammed (2014) 20. She sees that Pilates Exercises with Swiss Ball, led to improve the kinetic abilities and Pilates Exercises with Pilates ball, Pilates Exercises with dimple, preliminary innovative games in the warm-up part, as well as the International Federation of Athletics models, whose performance depended on the length of the step as the preparations for the barriers jumping race and preparation competitions for the competition of triple Jump and of the competition of throwing for adults included
in the part of the preparation skills, as the researcher used the bag designed by the International Federation of Athletics to provide an opportunity for kids and buds and beginners to discover athletics and this bag includes a comprehensive range of programs and tools and attractive plastic games that depend on new concept of athletics training which is a concept for building a healthy and attractive body for both children and buds in clubs and preliminary games included in the warm-up, where the performance of those exercises is aimed at developing the legs muscle strength) for the sample under research.

"Nesma Mohammed Farag" (2018) confirmed that: it is considered that Pilates exercises lead to the development of lengthening of the muscles of the body and achieve balance between muscle groups and speed and agility. (23:27)

The mentioned findings are consistent with Fatma ÖZTÜRK, Özhan BAVLI (2017) and (34). The most important results were that Pilates exercises had a positive effect on the level of endurance, balance, flexibility and strength.

The findings were agreed with the findings of Dilek Sevimli, Murat Sanri (2017), 32, where the most important results revealed that Pilate's exercises have a positive effect on the development of the physical characteristics of the sample under study.

Table (14) shows the percentages of change between the mean of (pre and post measurement) averages of the experimental group in the bone density variables under research. The table shows the percentages of the rates of change of the mean of the pre and post measurements, as follows:

The test of "Bone mineral density "Femur Rotation" BMD.Tro " reached the percentage of the rate of change in the post measurement rather than the pre measurement to 14.70%).

The test of "Bone mineral density "Femur neck" BMD. F.N " reached the percentage of the rate of change in the post measurement rather than the pre measurement to 14.78%).

The researcher attributed this improvement to Pilates mat exercises, specially exercises (1, 12, 11, 15) and Pilates exercises with Swiss ball, especially exercises (1, 4, 8, 6) and Pilates exercises with dimple and specially exercises (3, 4, 6), the International Federation of Athletics models for the race of barriers and the triple jump for children, which led to improve the strength and density of the femur, and mini-games included in the warm-up, where the performance of those exercises is aimed at developing bone density (rotation, neck, thigh) for the sample under research.

(Bone mineral density " Lumbar vertebrae " BMD "L2-L4") test reached the percentage of the rate of change in the post measurement rather than the pre measurement to 18.95%.

The researcher attributed this improvement to Pilates mat exercises, especially exercises (2, 6, 12, 13 and 15) and Pilates exercises with Swiss ball, especially exercises (2, 3, 4, 5, 8, 9), Pilates exercises with Pilates ball, including training exercises (1, 3, 7, 8), Pilates Exercises with dimple, training exercises (1, 2), and the International Federation of Athletics for the preparation of races and competitions of children under research included in the skill preparation part, which in turn led to improve the BMD (L2-L4), and preliminary games included in warm-up. The performance of the exercises aim at develops the BMD (L2-L4) bone mineral density for the sample under research.

"Nesma Mohammed Farag" (2018) states that Pilates Exercises work to strengthen and prolong the muscles that support the spine, next to its role in the improvement of the level of bone density, as it stimulates the production of synovial fluid that preventing the process of friction in the joints. (23:27)

These findings are consistent with the study of Angme Endera, Erden Zaferb, Can Filizb (2015), 25 and the results of Carmen Ileana (2017) (26) that the improvement between pre and post measurements for the benefit of post measurement in bone mineral density as a result of Pilates exercises.

The results of the study showed that the use of Pilates Exercises led to improve between the pre and post measurements of the experimental group in favor of the post measurement in bone mineral density.

Table (15) shows the percentages of change rate between the mean of the pre and post measurement for the experimental group in the physiological variables under research. The table shows the percentages of the rates of change in the mean of the pre and post measurements as follows:

The test of (Heart rate during rest "Auscultation") reached the change rate in the post measurement rather than pre measurement to (6.62%), and the test of (Heart rate after activity "Auscultation") reached the rate of change in the post measurement rather than pre measurement to (3.10%), and the test of " vital capacity of the lungs" reached the rate of change in the post measurement rather than pre measurement to (36.59%).

The researcher attributed this improvement to Pilates mat Exercises and drills Pilates Exercises with Swiss ball and Pilates Exercises with Pilates ball exercises and Pilates Exercises with dimple, and the International Federation of Athletics models listed in part skill and the Preliminary innovative games included in the warm-up as well as exercises of warm-up using step box number (18: 20).

"Saeed Abdul Hamid El Sayed" refers (2012) (8): the aerobic step box exercises led to the development of physical and functional variables under the research for the age group 9-12 years.

Janet A. Simmons, Austin C. Brown (2013) (36) sees: Pilates exercises occupies a great place among other exercises because of its many advantages to its practitioners; it leads to the efficacy of the heart and lungs thus improves the level of endurance.

The results of this study are consistent with the results of the study conducted by Nahed Khairi Fayyad, Rabab Attia Wahba (2010) (21) where the most important results that Pilates program has a positive effect on the level of physiological variables under research (Pulse and Biomass) of the experimental group under research.

The results of this study are consistent with the results of the study conducted by Erkel Arslanoğlu, Ömer ŞENEL (2013) (33). The most important results were that the Pilates training program has a positive effect on the experimental physiological abilities of the sample of research.

Based on the mentioned results of the previous studies and views of scientific references that dealt with exercises Pilates, the researcher was able to confirm the validity of the third hypothesis, which states: **" There are rates of change in some (physical - physiological - bone mineral density) variables and the level of performance of some competitions kids' athletics 11 - 12 years in favor of the post measurement"**

Discussing the results to ascertain the validity of the fourth hypothesis, which states:

"There are rates of change in the level of performance of athletics competitions among 11-12 year kids' under study in favor of the post measurement"

Table (16) shows the improvement rates between the mean (pre and post measurement) of the experimental group The table shows percentages of the improvement rates for the mean of pre and post measurements as the following:

"Hurdles race " 40m") " test in which reached the percentage of improvement in post measurement rather than pre measurement to (9.16)%.

The researcher attributed this improvement to Pilates mat Exercises training specially number (1, 5, 11, 14) and Pilates Exercises with Swiss ball specially No. (1, 6) Pilates Exercises with Pilates ball exercises and special training No. 5 (7, 8) and Pilates exercises with dimple specially training number (3, 4), which in turn led to improve the kinetic speed, and the preliminary innovative games included in the warm-up, as the performance of those exercises aimed at develop the kinetic speed of the research sample, Pilates mat exercises specially exercises (6), Pilates exercises with Swiss ball specially exercises (7, 8), Pilates exercises with Pilates ball specially exercises (1), Pilates exercises with dimple specially exercises No. (1, 6, 4) and models that in turn led to improve agility, and innovative preliminary games included in the warm up specially number (4, 6, 9, 11, 14, 16). These exercises were based on the compatibility between the various body members, Pilates exercises specially exercises (3, 7, 13 and 8) and exercises with Swiss ball, especially exercises (3) and Pilates exercises with Pilates ball specially exercises number (3, 4) Pilates Exercises with dimple exercises specially exercises No. (2), and the preliminary games listed in the warm up specially No. (10), as these exercises depend on the performance of To increase the kinetic range and training preparation skills for the race of barriers and the International Federation of Athletics models "preparation for the race of barriers" included in the skillful part of the proposed training program, which in turn led to improve the speed and pass the hurdles and then the development of the numerical level of the test.

"Teens ' javelin throw " test, in which the percentage of improvement in post measurement rather than pre measurement reached (9.89)%.

The researcher attributed this improvement to Pilates mat exercises, including exercises (1,6,12,11,8,15) and Pilates exercises with Swiss ball, specially exercises (1, 4, 8, 6, 7) Pilates exercises with Pilates ball, specially exercises (1: 8), Pilates exercises with dimple, specially exercises (1: 6), which also helped to develop muscle strength, Pilates exercises specially exercises (3, 7, 13, 8), Pilates exercises with Swiss ball specially exercises (3), Pilates Exercises with Pilates ball specially exercises (3, 4) and Pilates exercises with dimple specially exercises No. (2), and the innovative preliminary games included in the warm-up and the exercises and the simple movements grainy to the kids in addition to the thrill and motivation factors, and here we must point out that the kids at this stage loves the competitive games without feel the kids that it is a duty should be implement, and prepare the playground and the tools and organize them and provide movements that help to form

a picture in the mind of the kids able to link the image and movement and its similarity in the motor track with races and competitions in the athletes under research. so this has a great favor in the development of the variables under research in general and competitions In particular, "Azza Abdul Majid Ali" (2014) (9): The use of the preparatory games program has a statistically positive effect on improving the performance of some basic athletics skills for kids of late kids hood (9-12 years).
The prolongation exercises No. 10, which in turn led to the development of flexibility, which in turn led to improve the range of motion of throwing and the International Athletics Federation models “competitions of preparing of throwing for adults" included in the skillful preparation part, which led in turn to improve the power and speed of Spear and then develop the digital level of the test.

"Short run – up triple jump ", which the improvement rate reached in post measurement rather than the pre measurement to (6.57)%.

The researcher attributed the improvement to Pilates exercises with Swiss ball, Pilates Exercises with Pilates ball, Pilates Exercises with dimple, preliminary games included in warm-up part, and the International Federation of athletes models of the barriers race and the triple jump included in the skill preparation part which led to the development of speed approach and the level of triple jump and the stability of the " Hop – step - jump".

Jean Paterson (2009) states: "The presence of Pilate's exercises in training programs improves the skill level of the various sports activities. (35: 18)

The results of this study are consistent with the results of the study of Fatin Ismail Mohamed 2016 (12): where the results of the study showed the improvement of the skill level of the skill of the overwhelming beats of volleyball players the result of the use Pilates exercises.

It was studied by Samir Lotfy, Mohammed Salah, and Hind Farouk (2010). (40): The most important results were that the use of Pilate's exercises has a positive effect on the development of the skill level.

Based on the results of the previous studies and opinions of the scientific references that dealt with Pilate's exercises, the researcher was able to confirm the validity of the fourth rule, which states: **"There are rates of change in the level of performance of athletics competitions among 11-12 year kids 'under study in favor of the post measurement"**

Conclusions and recommendations:

CONCLUSIONS:

Through the objectives and hypotheses of the research and according to the sample and its variables and the results of the statistical method used and characteristics that are appropriate to the nature of the study, the researcher reached the following conclusions:

- Pilates exercises have a positive effect on physical abilities, physiological variables and the level of performance of athletics competitions among 11-12 year kids'.
- Pilates exercises are the best methods used to improve physical abilities and physiological changes.
- Pilates exercises have improved the performance of athletics competitions among 11-12 year kids'.

Recommendations:

Based on the findings of the research and the results of the presentation of the results and through the interpretation of the researcher makes the following recommendations:

- Conducting further studies using Pilates exercises for other races, field and track competitions for different age groups (first class beginners).
- Pilates training exercises Pilates in competitions and races for the field and track, especially this is the first study of its kind, which dealt Pilates exercises Pilates in athletics to the knowledge of the researcher.
- Conducting further studies using Pilates exercises for other competitions in other sports.
- Conducting other studies on Pilates exercises
- Other studies of Pilates Exercises Pilates exercises take direction kinetic analysis..
- Pilates exercises are trained in the training of beginners to improve the level of physical abilities and physiological variables.
- Conducting training sessions on Pilates exercises by the Egyptian Athletics Federation to raise the awareness of the trainers' importance, which helps to improve Egyptian numerical levels

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