The effect of cross-training with different training media on some physiological variables and performance level Skills of volleyball juniors

[1]Prof. Dr. Shaimaa El-Sayed Radwan

Introduction and research problem:

Every job needs planning, and every level of training also needs planning, especially training for higher levels. Therefore, planning in the field of sports training is nothing but one of the important strategic scientific means that helps in developing and coordinating programs for the training process to reach the desired sports level.

That is why trainers make continuous efforts to identify modern trends in sports training. Kramer et aka**rma and all**(1997) and Bastawisi Ahmed (1999) that diversity in training methods and techniques has its importance and need, diversity must be taken into consideration when preparing training programs, and the appropriate volume and intensity of training with the optimal choice of training performance speed leads to good and advanced results in the physical preparation of the player. (29:12)(22:5)

Muhammad Jaber Bariq'a points out:**2004)**Cross-training is useful in achieving tangible progress in the skill performance of an activity that depends on ability, speed, flexibility, and endurance, through diversifying training with higher intensity and for a longer period, while reducing exposure to injury, in addition to using a different sporting activity in which the same muscles used in the basic activity are used, and a kind of excitement is added to it when performing.32:17).

In this regard, both Zaki Muhammad Hassan and(2004) Cross-training has a positive effect on aerobic and anaerobic endurance, in addition to the improvements it adds to muscle strength and flexibility in the player's specialized activity. It also works to increase the ability of the circulatory and respiratory system to supply the muscles with the necessary oxygen during their work. In addition, it is a training method that contributes to increasing the intensity of competition in the basic type of activity by avoiding the negative effects in the training process represented by overload and sports burnout. (8: 118)

Bryant Stamford pointed out,**Brayant Stamford**(1996) Incidental training represents a strategy for organizing performance either in a single training unit or distributing it over successive training units by providing the greatest possible amount of diverse activities, taking into account their proper arrangement based on providing the energy sources necessary for performance (24:4).

"Lisa points out,"**Lisa " (2001)**Until the occasional trainingCross training is a modern method for maintaining aerobic capacity and general physical fitness of the mind and body while reducing the risk of injury or burnout. It is also characterized by balance, adventure, and diversity in many forms of sports such as running, exercises, water games, cycling, mountain climbing, weight training, hiking, and aerobic exercises (30: 273).

Both Graf and I agree.**Graf" (2001), "Germyen" (2002)**Cross-training is the use of another sport, activity, or training technique to help improve performance in the primary sport or activity.26: 274).

John Yasinda sees**John Yascenda" (2004)**Cross-training is a long-term exercise program that combines a variety of activities and sports to provide variety, reduce the risk of injury, and achieve all aspects of fitness. A cross-training program can include competitive sports or outdoor activities such as running, cycling, sailing, rowing, and fitness activities such as weight training and aerobics.27:3).

Zaki Muhammad Hassan points out ((1998 AD) Volleyball is one of the activities that has been positively affected by the development in the field of sports training, as it requires a high level of physical, skill and tactical aspects to keep pace with the new developments in this game. Volleyball is characterized by dynamism, which results in a high level of excitement, especially when practicing the requirements of the game. We notice that there is a difference in the kinetic rhythm of performance, and this is evident through the kinetic formations, rapid attack and defense, which called for the necessity of having creative abilities that are consistent with the skills required during actual practice within the competition, which is due to the development of the game. (9:7)

The physical requirements vary from one skill to another in volleyball in terms of the relative importance of each element to the rest, and require a high level of strength, endurance, and speed, and "Zaki Muhammad Hassan points out" (2004) and Saad Hammad Al-Jumaili (2009) that when training for the different

[1]Professor, Department of Sports Training - Faculty of Physical Education for Girls - Helwan University

requirements in volleyball, we use weight training which aims to increase strength and ability, and cross-training activities that include weight training at maximum intensity with low repetitions, as well as the use of plyometric exercises such as the jump box (jumping with both feet, side jump on both sides of the box), in addition to cross-training activities for aerobic and anaerobic endurance, flexibility, agility and speed training, which work to develop physical and physiological efficiency, which in turn works to improve skill performance. (10:549) (52:12)

Both agree**Ahmed Abdel Dayem, Ali Mustafa(1999) and Elaine Wadih Faraj (2011)**Volleyball is one of the sports that receives great attention in various countries in an attempt to reach the level of international and global championships. Its matches are characterized by a fast pace and continuous offensive and defensive plans throughout the match. There are many skills in volleyball, the most important of which is the smash hit, as the smash hit is considered one of the effective skills because of its essential impact on the results of matches. It plays an important role in reaching the highest effectiveness as it is the final part of the offensive plans and the main means of scoring points.(1:12)(25:3).

And he mentions both from Smart Mohammed Good (2011) Dalin **Darlene**(1998 AD) that game The ball The plane from Games Collective that Characterized by Her performance Some Appearances Private , where It is worth Signal to that Player The ball The plane Subscribe in Centers Defense And the attack under Effects especially Requires From him Responses Physical Fast And accurate , as Performs The player some Skills like beating crushing And a wall The chest And sending from Jump And it is performed all that Skills on network It is Its height Obstacle For players , And in order to succeed The player in Performance The skilled Must from that Enjoy With capabilities Skill Physical And physical And mentality Functional especially To perform Duties Kinetic Required on this Height .(65:9)(102:25)

Moran and MacLean point out that(2006 AD) Cross-training is the way to use many different exercises such as running, swimming, rowing, cycling and various games that greatly affect the basic athletic activity to make the athlete stronger, more resilient, more flexible and agile. Swimming is one of the sports that requires its practitioners to have special physical elements to reach the optimal skill performance, and cross-training is the way to reach the development of these physical abilities. (95:23)

In this regard, Felix Klebs points out:Phyllis Clapis 2005 "Cross-training involves different forms of exercises performed in the same training session or in training sessions within a schedule designed for this purpose. For example, you can run and lift weights on one day and swim on the second day because the purpose of the different exercises is to use different parts of the body. In addition, cross-training allows you to use several types of exercises. For example, all of the following exercises are good for the heart, such as running, leg strength exercises, and swimming. Most of the work of these exercises is on the upper body. By adding this variety of exercises to the athlete's usual training routine, you will notice the improvement in the total body strength, endurance, and flexibility." (93:31)

We notice Which Previously that it It is characterized by game The ball The plane By force And speed They are from Elements Physical High intensity These two The two elements They consider from Requirements Home in sports The ball The plane So He should that Includes all Programs Training The athlete on development This is amazing Elements For their connection By nature And level Performance To ensure effectiveness any type from Types And methods Training No Bad that He is that With warranty maximum Benefit Physiology Possible.

And during what Check it out attic Researcher from Studies Previous in area Training The casual (3),(5),(7),(11),(20) to that Use Trainings The cross In various The middle of it Water or Sandy or Halls Fitness Physical or Halls The parquet Similar For performance in The ball The plane from better Roads in development Elements Fitness Physical And physiology And this she Elements Home in The ball The plane.

And during a job Researcher With training The ball The plane Note Researcher that it despite Evolution Technical And cognitive in area training The ball The plane unless that it there loss in Capabilities Physiology For players Especially during Period Transitional For the season My training last Which Produces About him a lot from Errors Accompanying For performance The skilled Especially in condition loss Capabilities Physiology And physical Private Therefore Its impact Negative The obvious on results Performance And here Raa Researcher that it from essential to lift level Fitness Physical and the attributes Physiology I have Junior The ball The plane from during following Theories and Ways Training Modern And other Traditional For training Especially Using theory Training The casual until no leaking boredom to same Juniors Therefore Reduces Their motivation about Training And here It became clear importance And a problem Search Represented by in attempt Recognition "impact Training The casual With Environments Training Different on some Variables Physiology And level Performance The skilled I have Junior The ball The plane.

Research objective

Aims Search to Recognition on impact Training The casual With Environments Training Different on some Variables Physiology And level Performance The skilled I have Junior The ball The plane.

Research hypotheses:

- There are statistically significant differences between the averages of the pre- and post-measurements in the level of some physiological variables and the level of skill performance, in favor of the post-measurement among the volleyball juniors of the experimental research group.
- There are statistically significant differences between the averages of the pre- and post-measurements in the level of some physiological variables and the level of skill performance, in favor of the post-measurement among the volleyball juniors in the control research group.
- There are statistically significant differences between the averages of the two dimensional measurements in the level of some physiological variables and the level of skill performance, in favor of the dimensional measurement for the experimental research group.

Some terms used in the research

Occasional training:Cross-Training

An organizational form for the methods, techniques and means of sports training, based on the diversity in practicing different activities and sports related to the specialized activity practiced, aiming to develop physical abilities that are reflected in improving the level of the components of the player's training condition, through the diversity in the use of modern devices, tools and techniques in the field of sports training.18:6)

Steps to conduct research

Research Methodology

The researcher used the experimental method with a design for the experimental and control groups, as it is appropriate to the nature of the research and to achieve its goals and hypotheses.

Research sample

The research sample included the junior volleyball players of Tanta Sports Club for the training season (2022/2023) and the age level (14-16) years and their number is (24) youth were divided into two experimental and control groups, each consisting of (8) youth in addition to (8) youth to conduct the exploratory study of the research.

Homogeneity of the research sample:

The researcher measured the variables (age, height, weight) on the research sample, the number of which was (24) Juniors, with the aim of creating harmony between them, as is clear from Table (1).

Table (1)

Homogeneity of the research sample N=28

M	Variables	Unit of measure	Arithmetic mean	Standard deviation	The mediator	Coefficient of skewness
1	**the age**	**year**	**14.83**	**0.55**	**14.80**	**0.92**
2	**height**	**poison**	**161.9**	**2.11**	**161.5**	**-0.54**
3	**the weight**	**kg**	**54.2**	**1.29**	**54.00**	**1.10**
4	**Training age**	**year**	**3.11**	**0.20**	**3.10**	**0.32**

It is clear from the table (1) The skewness coefficient of the research variables was between (±3) and lies under the normal curve, which indicates the homogeneity of the sample.

Equivalence of the two research groups:

The researcher found equivalence between the experimental and control research groups in light of the following variables: "growth rates (age - height - weight), physiological variables under study" and the table (2) It explains that.

Table (2)

Significance of differences between the experimental and control groups in each of the growth rates Physiological variables and skill performance level under investigation (n =16)

Variables		Unit of measure	Experimental group (n =8)		Control group (n =8)		Differences between the two averages	Calculated value of (t)	Significance level
			M	A	M	A			
Growth rates	Age	year	14.62	0.62	14.91	0.51	0.29	0.20	Not significant
	height	poison	162.5	1.20	161.0	00.32	1.50	0.51	Not significant
	the weight	kg	53.84	0.32	54.01	0.51	0.17	0.51	Not significant
	Training age	year	3.02	0.58	3.08	0.14	0.06	0.84	Not a clue
Physiological variables	Number of breaths per minute during exertion	Number/s	37.20	0.51	37.11	0.54	0.09	0.32	Not significant
	maximum absolute oxygen consumption	liter/min	3.52	0.32	3.49	0.32	0.03	0.74	Not significant
	maximum relative oxygen consumption	ml/kg/h	0.51	0.25	0.54	085	0.03	0.47	Not significant
	Respiratory coefficient	liter/min	0.99	0.32	0.95	0.45	0.04	0.63	Not significant
	Heart rate	pulse/min	146.2	0.84	145.1	0.32	1.1	0.47	Not significant
	pulmonary ventilation	liter/min	1.75	0.32	1.72	0.84	0.03	0.36	Not significant
	Respiratory fitness coefficient	ml/kg	11.60	0.14	11.52	0.32	0.08	0.41	Not significant
Skill performance level	Sending from the jump	degree	36.10	0.65	36.15	0.49	0.05	0.63	Not significant
	Scroll down	degree	3.61	0.85	3.63	0.14	0.02	0.47	Not significant
	Swipe from top	degree	0.95	0.32	0.94	0.47	0.01	0.30	Not significant
	crushing blow	degree	1.02	0.15	1.01	0.61	0.01	0.87	Not significant

Table value of (t) at (degree of freedom)18) The significance level is 0.05 = 1.746.

It is clear from the table (2) There are no statistically significant differences between the experimental and control research groups in both growth rates and physiological variables under study, as all calculated (t) values are less than the tabular (t) value at the significance level of 0.05, which indicates their equivalence in those variables.

tools and means collection Data :

First: Devices and tools used in Search:

*A hall equipped with tools
*Swimming pool
* Volleyball court (legal)
*Multi-purpose device
*Wooden box50x50 cm
*Device ×oxcgen 5
*cones
*Stop watch1/100 of a second
*sling
*Restameter
*Running track (sand)

secondly - Tests used in Search: Attached (2)

-a testOxycon-5 on a moving belt for measuring respiratory cardiovascular variables.

Russell-Lange test for serve from jump.
-Scroll test from the bottom.
-Top to front pass test.
-The test of the straight diagonal smash from the center.

Survey study:

This study was conducted during the period from Saturday3/5/2022 to Tuesday 6/5/2022 AD, and its procedures resulted in the following: -

- Testing the validity of devices and tools used in training and testing.
- The variables under study are arranged in order to facilitate measurement and not to burden beginners.
- The tests were explained to the assistant colleagues.

Seventh: Scientific transactions for the tests used:

A- Account of honesty:

The researcher calculated the coefficient of validity on10/5/2022 to 14/5/2022 using discriminant validity by calculating the differences between the upper and lower quartiles of the exploratory group, which numbered (8) young people.

Table (3)

Significance of differences between the upper and lower springs in tests of physiological and skill variables in volleyball juniors

(n =8)

Variables	Tests	Unit of measure	Upper Spring		Lower spring		Calculated T value
			S	A	S	A	
Physiological variables	Number of breaths per minute during exertion	Number/s	35.10	0.54	33.12	0.11	3.15*
	maximum absolute oxygen consumption	liter/min	3.60	0.32	3.45	0.21	3.20*
	maximum relative oxygen consumption	ml/kg/h	0.62	085	0.51	0.14	2.89*
	Respiratory coefficient	liter/min	0.98	0.45	0.92	0.32	2.54*
	Heart rate	pulse/min	139.20	0.32	133.10	0.04	3.65*
	pulmonary ventilation	liter/min	1.70	0.84	1.52	0.21	3.47*
	Respiratory fitness coefficient	ml/kg	11.87	0.32	10.92	0.21	3.15*
Skill performance level	Scroll down		39.10	0.49	35.15	0.15	3.60*
	Sending from the jump	degree	3.89	0.14	3.10	0.21	3.15*
	Swipe from top	degree	1.10	0.47	0.99	0.45	3.24*
	crushing blow	degree	1.22	0.61	0.93	0.11	3.87*

* The value of the table at the level of0.05 = 1.860

It is clear from the previous table that there are statistically significant differences between the upper and lower quartiles, which indicates the validity of the tests used.

B- Stability calculation:

The researcher used the method of applying the test and reapplying it to calculate the stability of the tests used on the same survey sample. The researcher considered the data for calculating the validity as the data of the first application in stability. The application was repeated two days after the first application on the day of15-16/5/2022 AD, with the same conditions, terms and procedures.

Table (4)

The significance of the differences between the first and second applications in the tests of physiological and skill variables for volleyball juniors

(n =8)

Variables	Tests	Unit of measure	First application		Second application		Correlation coefficient
			S	A	S	A	
Physiological variables	Number of breaths per minute during exertion	Number/s	34.11	0.41	34.10	0.51	0.960
	maximum absolute oxygen consumption	liter/min	3.52	0.36	3.54	0.36	0.910
	maximum relative oxygen	ml/kg/h	0.565	0.21	0.569	0.51	0.950

	consumption						
	Respiratory coefficient	**liter/min**	**0.95**	**0.84**	**0.96**	**0.47**	**0.951**
	Heart rate	**pulse/min**	**136.15**	**0.14**	**137.10**	**0.51**	**0.941**
	pulmonary ventilation	**liter/min**	**1.61**	**0.32**	**1.63**	**0.98**	**0.910**
	Respiratory fitness coefficient	**ml/kg**	**11.39**	**0.84**	**11.45**	**0.47**	**0.930**
Skill performance level	**Scroll down**		**37.12**	**0.32**	**37.25**	**0.32**	**0.940**
	Sending from the jump	**degree**	**3.49**	**0.14**	**3.51**	**0.10**	**0.952**
	Swipe from top	**degree**	**1.045**	**0.84**	**1.42**	**0.32**	**0.947**
	crushing blow	**degree**	**1.075**	**0.54**	**1.081**	**0.78**	**0.961**

* Table value (r) at the significance level (0.05) = 0.624

It is clear from the previous table that there is a statistically significant correlation at the level of0.05 indicating that the tests used have acceptable reliability coefficients.

Eighth: Cross-training program: Attached (5)

1- Program objective:

Improving the level of physiological abilities and skill performance among volleyball juniors.

2- Program design principles:

When developing a cross-training program, the researcher took into account the following:

- Research sample level.
- Providing the devices and tools required to implement the research procedures.
- Total program time.
- Number of training units and time of each unit.
- Time distribution of the training unit.
- Technical content of the training unit and programme.
- Appropriate formation of training load components for the program and unit.
- Providing diversity and excitement in the activities and exercises used.
- Gradual performance from easy to difficult, and from simple to complex.

The form of performing the exercises is similar to the nature of performance in volleyball.

- Comprehensiveness and integration between the components of the proposed program using cross-training.

- Proposed training program content:

After reviewing specialized references and related studies and surveying the opinions of experts through (personal interview), the duration of the program, the number of units per week, and the content of the training program were determined. Based on this, the researcher divided it into three main stages, as shown in the table (5).

Table (5)
Cross-training Program Stages

Time	**Comfort**	**Size**	**Intensity**	**Percentage**	**Stage Contents**	**Number of units**	**Stage**
50 Q	Fixed	High	from60-70% above average	70 to 80%	Physical numbers	9	First (General preparation)
13Q				20 to 30%	Technical preparation		
25q	Fixed	less	70-80% Less than maximum	40 to 45%	Physical preparation	12	Second (Special preparation)
38 BC				55 to 60%	Technical preparation		
An inter-test was conducted at the end of the special preparation phase to evaluate the programme content.							
13Q	Fixed	less	80-95% Less than maximum To the farthest	15 to 20%	Physical preparation	6	Third (Integration stage)
50q				80 to 85%	Technical preparation		

- Program time division:

The program included:27) A training unit was implemented in 9 weeks, at a rate of (3) three units per week, with a unit duration of (90) minutes, based on the opinions of the experts. Appendix (1). Appendices (7) and (8) explain the proposed cross-training program for the various training environments, which was applied to the experimental group.

- Total weekly training unit time (270) minutes and the total time of the cross-training program (2430) minutes = (40 hours + 30 minutes)

Distribution of daily unit time in the cross-training program:

The researcher divided the training unit time into three sections, and the table shows (6) Distribution of daily training unit content.

Table (6)

Time distribution of the three sections in the daily training units in the cross-training program

Time	Content		Daily training unit parts		M
	Training followed	Casual training			
5 Q	Administrative work	Administrative work	the introduction	Primer	1
17 Q	Body preparation	Body preparation	Warm-up		
Total time (63) The time of the main section is determined according to the distinctive characteristics of each stage (for cross-training).	Education and training skills under research	Cross-training activities	Physical numbers	Main	2
		Skills training under consideration	Skill preparation		
5 Q		Calming and relaxation exercises	Calm down	Conclusion	3
90 BC				Total time	

Basic experience

1- Pre-measurement:

Pre-measurements of the selected research variables were performed as follows:

- 5/24/2022 Physiological variables tests on the Oxycon 5 device in the hall of the Physiological Measurements Laboratory affiliated with the Sports Medicine Unit at Tanta Sports Club, with the assistance of the Physiological Measurements Laboratory at the Faculty of Physical Education, Tanta Sports University.
- 5/25/2022 Skill performance tests at Tanta Sports Club grounds.

- Program application:

The cross-training program and the training method used by the researcher were applied for a period of (9) Weeks, at a rate of (3) units per week, and in the main part of the training unit, with a duration of (90) minutes, during the period from 5/26/2022 to 8/25/2022, taking into account the night training periods during the month of Ramadan and increasing the program period by a week due to Eid al-Fitr on the research sample. The usual teaching method (model and explanation) was also applied by the researcher at a rate of three (3) units per week and the same time as the experimental group, on the volleyball courts of the Assiut Cement Club.

- Dimensional measurement:

Dimensional measurements were carried out on26-27/8/2022 AD, under the same conditions as the pre-measurement. Then the data was collected and prepared for statistical processing.

Tenth: Statistical treatments:

Statistical processing was carried out by computer using statistical software.SPSS is:

- Arithmetic mean
- Standard deviation
- Coefficient of torsion
- The mediator
-Test(s)
- Correlation coefficient

Presentation and discussion of results

Table (7)

The significance of the differences between the pre- and post-measurement in the level of some physiological variables and skill performance among volleyball juniors, the experimental research group n=8

Variables	Unit of measure	Pre-measurement		Dimensional measurement		Differences between the two averages	improvement rate	value (t) Calculated	Significance level
		M	A	M	A				
Number of breaths per minute during exertion	Number/s	37.20	0.51	31.10	0.51	6.10	19.61%	3.70	Dal
maximum absolute oxygen consumption	liter/min	3.52	0.32	4.15	0.14	0.63	15.18%	3.95	Dal
maximum relative oxygen consumption	ml/kg/h	0.51	0.25	0.98	0.11	0.47	92.15%	4.11	Dal
Respiratory coefficient	liter/min	0.99	0.32	1.55	0.51	0.56	56.56%	4.36	Dal
Heart rate	pulse/min	146.2	0.84	163.1	0.63	16.90	11.55%	3.91	Dal
pulmonary ventilation	liter/min	1.75	0.32	1.90	0.84	0.15	8.57%	3.14	Dal
Respiratory fitness coefficient	ml/kg	11.60	0.14	12.25	0.47	0.65	5.60%	3.28	Dal
Scroll down	degree	36.10	0.65	38.10	0.32	2.00	5.54%	3.97	Dal
Sending from the jump	degree	3.61	0.85	4.15	1.02	0.54	14.95%	2.99	Dal
Swipe from top	degree	0.95	0.32	1.39	0.47	0.44	46.31%	3.10	Dal
crushing blow	degree	1.02	0.15	1.45	0.62	0.43	42.15%	3.98	Dal

*** Table (t) value at the significance level (0.05)=1.860**

It is clear from Table No. (7) There are statistically significant differences between the averages of the pre- and post-measurements in the level of some physiological variables and skill performance among volleyball juniors in favor of the post-measurement, as the calculated (t) value was greater than its tabular value at the significance level (0.05) and in favor of the post-measurement in the experimental research group.

Table (8)

The significance of the differences between the pre- and post-measurement in the level of some physiological variables and skill performance among volleyball juniors, the control research group n=8

Variables	Unit of measure	Pre-measurement		Dimensional measurement		Differences between the two averages	improvement rate	value (t) Calculated	Significance level
		M	A	M	A				
Number of breaths per minute during exertion	Number/s	37.11	0.54	35.10	0.51	2.01	5.72%	2.70	Dal
maximum absolute oxygen consumption	liter/min	3.49	0.32	3.55	00.36	0.06	1.71%	2.88	Dal
maximum relative oxygen consumption	ml/kg/h	0.54	085	0.72	0.12	0.28	51.8%	2.84	Dal
Respiratory coefficient	liter/min	0.95	0.45	1.15	0.47	0.20	21.05%	2.65	Dal
Heart rate	pulse/min	145.1	0.32	151.2	0.32	6.10	4.20%	2.99	Dal
pulmonary ventilation	liter/min	1.72	0.84	1.89	0.21	0.17	9.88%	2.54	Dal
Respiratory fitness coefficient	ml/kg	11.52	0.32	11.98	0.25	0.46	3.99%	2.87	Dal
Scroll down	degree	36.15	0.49	37.12	0.15	0.97	2.68%	2.31	Dal
Sending from the jump	degree	3.63	0.14	3.70	0.32	0.07	1.92%	2.57	Dal
Swipe from top	degree	0.94	0.47	1.12	0.54	0.18	19.14%	2.96	Dal
crushing blow	degree	1.01	0.61	1.15	0.47	0.14	13.86%	2.41	Dal

*** Table (t) value at the significance level (0.05)=1.860**

It is clear from Table No. (8) There are statistically significant differences between the averages of the pre- and post-measurements in the level of some physiological variables and skill performance among volleyball juniors in favor of the post-measurement, as the calculated (t) value was greater than its tabular value at the significance level (0.05) and in favor of the post-measurement in the control research group.

Table (9)

The significance of the differences between the two dimensional measurements in the level of some physiological variables and skill performance among volleyball juniors, group N1=n2=8

Variables	Unit of measure	Experimental group		Control group		value (t) Calculated	Significance level
		M	A	M	A		
Number of breaths per minute during exertion	Number/s	31.10	0.51	35.10	0.51	3.70	Dal
maximum absolute oxygen consumption	liter/min	4.15	0.14	3.55	00.36	4.10	Dal
maximum relative oxygen consumption	ml/kg/h	0.98	0.11	0.72	0.12	3.56	Dal
Respiratory coefficient	liter/min	1.55	0.51	1.15	0.47	3.84	Dal
Heart rate	pulse/min	163.1	0.63	151.2	0.32	4.01	Dal
pulmonary ventilation	liter/min	1.90	0.84	1.89	0.21	3.69	Dal
Respiratory fitness coefficient	ml/kg	12.25	0.47	11.98	0.25	3.15	Dal
Scroll down	degree	38.10	0.32	37.12	0.15	2.99	Dal
Sending from the jump	degree	4.15	1.02	3.70	0.32	3.10	Dal
Swipe from top	degree	1.39	0.47	1.12	0.54	4.25	Dal
crushing blow	degree	1.45	0.62	1.15	0.47	2.91	Dal

*** Table (t) value at the significance level (0.05)=1.746**

It is clear from the table (9) There are statistically significant differences between the averages of the post-measurements in the level of some physiological variables and skill performance among volleyball juniors in favor of the post-measurement, as the calculated (t) value was greater than its tabular value at the significance level (0.05) and in favor of the experimental group.

Second: Discussion of the results:

It is clear from Table No. (7) There are statistically significant differences between the averages of the pre- and post-measurements in the level of some physiological variables and skill performance among volleyball juniors in favor of the post-measurement, as the calculated (t) value ranged from (4.36) for the breathing coefficient variable to (2.99) for the downward transmission variable, and both are greater than their tabular value at the significance level (0.05).

The researcher attributes this improvement to the use of the proposed program in its various training environments (water, sand, and park), as the use of water training within the proposed program led to an improvement in the level of pulmonary ventilation and ease of performance and movement in the water, benefiting from the properties of water in carrying objects. The use of training on sand led to the development of the general endurance characteristic of juniors in general, which was reflected in turn during the training simulating performance on the park volleyball court and appeared clearly in the improvement in the level of skill performance for the skills under study.

In this regard, Zaki Muhammad Hassan points out:2004 AD) to the reference of sports training scientists to the method of cross-training, such as Lora Gorbilo, that there is absolutely no substitute for using cross-training within sports programs, due to its positive effect in improving the pace of the entire sports season. (25:8)

Both Ilham Abdel Moneim Ahmed indicate,Princess Amir Al-Baroudi ((2008) that cross-training is a method that combines two or more activities in an exercise program. It was specifically designed to develop fitness, provide the necessary rest for stressed muscle groups, reduce the incidence of injury, eliminate monotony in training, and reduce the risk of burnout resulting from participation in individual training programs. (25:4)

Remember. Shaimaa Al-Sayed Radwan ((2011) that cross-training is a different use of activities to achieve comprehensive adaptation in specialized sports activity, as it uses activities outside specialized training to provide a break from the effects of training in the specialized sport, which allows the muscles, tendons, bones, joints and ligaments a short break, and these exercises aim to improve the athlete's muscular balance. (15:13)

The results of this study are consistent with what Qais Jiyad Nayef indicated.2012 AD) (14), Muhammad Hussein Ahmed (2004 AD) (18), that cross-training is training in more than one sport at the same time or training the elements of different physical abilities such as endurance, strength and flexibility at the same time, where competitors train in swimming, running and cycling.

The researcher attributes the improvement in the dimensional measurements of the experimental group to following the scientific method in preparing the program, which precisely defined its objectives in developing muscular capacity, strength, speed, agility, and the required range of motion in performance, which had a great impact in improving the level of skill performance through the use of cross-training, including water and sand training, among others.

Zaki Mohammed Hassan pointed out that(2004) (8) All those working in the sports field explain that water training facilitates the task of motor performance, not only that, but it extends to being a method for advancement within sports training programs, and also a means for advancing muscular strength and endurance among athletes.

Both Mohamed Lotfy El Sayed agree.**2011 AD) "Zaki Muhammad Hassan" (2011) Saad Hammad Al-Jumaili (2002 AD)**Endurance is one of the most important physical components for volleyball players of all specializations, because it forms a strong foundation for them to perform various skills, and thus an important factor in achieving a special physical condition that enables players to continue playing and achieve victory in matches.21:22)(98:9) (23:29)

Both Muhammad Ahmad Al-Ghabbarawi point out:(2003 AD) Muhammad Hamdi Nour El-Din (2006 AD) that the game of volleyball requires the effective use of the body to produce power and employ it in skills, as the serve requires maximum power while the performance of the pass requires control of power, while dropping the ball from the top of the net requires little power. It also explains the necessity of having a high level of strength, endurance and flexibility in volleyball matches. Therefore, the development of these abilities is available within cross-training activities, including weight training, plyometric training, and also includes training for aerobic endurance and aerobic endurance. (92:16) (23:29)

The results of this study agree with Mr. Sayed Saad (2005 AD (2), Elham Abdel Moneim Ahmed, Amira Amir Al-Baroudi (2005 AD) (4), Hamdi Ibrahim Yahya (2005 AD) (6) on the importance of using cross-training in improving the level of physiological and physical capabilities of players during training seasons.

Thus, the first hypothesis was achieved, which states that there are statistically significant differences between the averages of the pre- and post-measurements in the level of some physiological variables and the level of skill performance, in favor of the post-measurement among the volleyball juniors in the experimental research group.

It is clear from Table No. (8) There are statistically significant differences between the averages of the pre- and post-measurements in the level of some physiological variables and skill performance among volleyball juniors in favor of the post-measurement, as the calculated (t) value ranged from (2.99) for the heart rate variable to (2.31) for the downward sending variable, and they are both greater than their tabular value at the significance level (0.05).

The researcher attributes this to the fact that the programme followed and used in teaching and training young people has contributed to improving some variables, but the training used did not take into account coordination and comprehensiveness between these elements to achieve their goal and thus develop skill performance.

Saad Hammad Al-Jumaili points out:(2002 AD) Training must be characterized by comprehensive and integrated components, and this is what the program followed lacks. Also, the lack of diversity in resistance training negatively affects the development of physical abilities due to the similarity of the movement path to the performance requirements. Also, training using resistance leads to the muscles being exposed to stress and pressure, and with the continuation of this exposure during the training period, we find that the internal structure of the muscles will adapt to such stresses, including the size of the muscles, their strength, the systems that work on them, the ligaments and tendons (68:11).

This is consistent with what Muhammad Subhi Hassanein reached.(2000 AD) Traditional training may contribute to a small degree of improvement, as performance within training units is somewhat boring, lacks excitement, and has a single rhythm, devoid of variety and suspense. (62:26)

As Essam Abdel Khaleq points out:**2003)**Sports training does not stop at one level or another and is not limited to preparing the higher levels (championship sector) only, as each level has its own methods and techniques. Accordingly, sports training is a process of continuous improvement and development of the level of players in different sports fields, in addition to training, improvement and progress of the high sports level to the

top and so on, as the level of training does not stop at certain limits, as progress is continuous and what we describe today as a good level, does not become good tomorrow (22:15)

The results of this study agree with both Ahmed Abdel Dayem Al-Wazir and Ali Mustafa Taha (1999 AD) (1), Al-Laylin Wadih Faraj (2008 AD) (3) Saad Hammad Al-Jumaili (2002 AD) (10) Muhammad Ahmad Al-Ghabbarawi (2003 AD) (16), Muhammad Lutfi Al-Sayyid (2011 AD) (22) on the importance of the volleyball coach taking into account the use of modern and diverse training methods to develop the physical, technical and skill capabilities of volleyball players.

Thus, the second hypothesis was achieved, which states that there are statistically significant differences between the averages of the pre- and post-measurements in the level of some physiological variables and the level of skill performance, in favor of the post-measurement among the volleyball juniors in the control research group.

It is clear from the table (9) There are statistically significant differences between the averages of the post-measurements in the level of some physiological variables and skill performance among volleyball juniors in favor of the post-measurement, as the calculated (t) value for the passing variable ranged from the highest (4.25) to (2.91) for the smashing variable, which is greater than its tabular value at the significance level (0.05) and in favor of the experimental group.

The researcher attributes this improvement to the use of the cross-training program applied to the volleyball juniors in the experimental research group and the use of training in various training environments, including the use of water training and aquatic training, which led to an improvement in physiological abilities reflected in the level of skill performance on the parquet floor, from an improvement in the variables of smashing, shooting, and passing from above and below.

In this regard, he points outHamdi Ibrahim Yahya((2005 AD) that the method of integrating cross-training or transverse training into the training program represents a strategy that organizes performance and may be in one training unit or distributed over successive training units, taking into account proper training for them based on providing the energy sources necessary for motor performance. (51:6)

The results of this study agree with Ilham Abdel Moneim Ahmed.,Princess Amir Al-Baroudi(2008 AD)Cross-training activities can be incorporated into the warm-up and cool-down section, as they help prepare the body for intense athletic performance, help prevent and treat injuries, and are also part of rehabilitation after sports injuries.22:4)

Zaki Mohammed Hassan points out:(2004 AD) until the most active cross-training and aerobic and anaerobic muscle work are chosen according to the specifics of each sport individually and according to the needs of each player. The training is performed on the same day as the basic training, and the training program must consist of proportions of aerobic and anaerobic exercises and exercises that combine aerobic and anaerobic endurance and differ according to the goal and periods of the training season. (251:8)

The researcher believes that the training program that includes a set of aerobic and anaerobic exercises has a positive effect on improving the level of skill performance and also works to increase the ability of the circulatory and respiratory system to supply the muscles with the necessary oxygen during their work. In addition, it is a training method that contributes to increasing the intensity of competition in the basic type of activity by avoiding the negative effects in the training process represented by overload and sports burnout.

These results are consistent with the findings of Mr. Sayed Saad's studies.2005 AD) (2), Hamdi Yahya (2005 AD) (6) on the importance of cross-training in improving the level of physical and physiological abilities among players and its impact on improving physical variables.

There are statistically significant differences between the averages of the two dimensional measurements in the level of some physiological variables and the level of skill performance, in favor of the dimensional measurement for the experimental research group.

Conclusions: -

In light of the research results and within the limits of the research sample, the researcher reached the following conclusions:

1. The proposed program using cross-training has a positive effect on developing some physiological variables (number of breaths per minute during exertion - maximum absolute and relative oxygen consumption - respiratory coefficient - heart rate - pulmonary ventilation - respiratory fitness coefficient) in volleyball juniors.

2. The proposed program using cross training has a positive effect on developing some skills (passing from below - serving from a jump - passing from above - smashing) in volleyball.

3. The proposed program using cross-training has a better positive effect than traditional training in developing some physiological and skill performance levels in volleyball.

Recommendations:

In light of the research results, the researcher recommends the following:

1. Using the proposed program with cross-training when training the physical and physiological abilities of volleyball players.
2. Focus on cross training when training skills for volleyball juniors.
3. Conduct similar studies on defensive and offensive volleyball skills.
4. Conducting similar studies in various sports activities.

reviewer
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