Studying some biological characteristics as a basis for selecting modern pentathlon players

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Introduction and research problem:

Biological science is considered one of the indispensable sciences for those working in the sports field, including coaches, teachers, and administrators. It is not possible to raise the level of a player unless the coach is familiar with the biological aspects of the player. This science can be used in selecting and directing the type of sport that suits the individual's biological capabilities. (2: 7)

We find that practicing any sporting activity requires some biological characteristics (physical and functional) that must be present in the person practicing it in order to excel in it. There are sports that require the availability of an element of speed as a basic condition, and other sports require height or certain differences in the lengths of parts of the body, while other sports require The element of endurance and a high degree of efficiency in the circulatory and respiratory systems. Biology is divided into the morphological aspect, and this is concerned with physical measurements, which are of great importance in the performance of sports activity. Players perform sports movements with their bodies, which differ in their measurements from one individual to another, which consequently leads to a difference in the level of performance. (9: 15)

Muhammad Yousef Al-Sheikh and Yasin Al-Sadiq (1996) mention that the importance of characteristics has been confirmed by global numbers and levels, so every sporting activity has its own biological requirements and characteristics, and this is linked to muscular work and performance. (22: 12)

Gould & Krane (1992) agree that excellence in sports is the result of many biological, functional and psychological factors, and contemporary years are witnessing increasing interest in the biological factor as it is responsible for helping the athlete achieve maximum performance and ensuring his stability on the day of competition. (29: 7)

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Ahmed Mahmoud Ibrahim (1995) also believes that trying to identify biological facts will contribute to the effectiveness of training processes, and it is also considered one of the most important foundations that help the coach achieve the goals of planning and implementing his training programs that aim to bring the player to the highest level in specialized sports activity. (8: 126)

Wajih Ahmed Shamandy (2002) points out that each sporting activity has biological characteristics and specifications that distinguish it from other sporting activities and that are consistent with the requirements of that activity. He stressed that morphological and functional measurements for the physical development of athletes represent great importance in building the sports training process, as they are an important pillar. Controls the selection and selection of young people for movement activities. (24: 217)

The modern pentathlon sport is considered one of the sports that has a special nature, as it is a complex digital sport. This does not negate the fact that it is an individual sport that has a special place among all other sports, as it includes five sports, each of which requires special physical, skill and mental abilities, and from here comes the special philosophy of the pentathlon sport. Modern pentathlon, which depends largely on the player challenging his abilities and skills in five successive competitions. Baron de Coubertin is considered the founder of the modern pentathlon sport and was the first to stress the importance of including it in the Olympic Games program for the first time at the meeting of the International Olympic Committee in Berlin in 1906, and indeed It was included for the first time in the Stockholm Olympic competitions in Sweden in 1912. The International Federation for Modern Pentathlon was established in 1948. The first men's world championship was held in 1949 in Stockholm, while the women's first world championship was held in 1981 in London. (26: 31) (27: 2)

The modern pentathlon sport consists of five sports: (archery, swimming, fencing, equestrian, and running). These five sports are different sports in terms of performance, form, performance conditions, and tools used, and each of them has its own advantages, but they are similar to each other and complement each other to form

the sport of the pentathlon. Hadith, which those who practice it are called (the perfect athlete), for example:

As for the sport of shooting, it requires mental effort and a great deal of nervous control and balance, as it requires intense concentration to hit the target. (15: 178)

As for the two sports (swimming and running), each of them requires a great effort in training and competition to record the best numbers. However, the nature of the medium in which swimming is practiced, which is the water environment, differs from the nature of practicing running. Despite this, there is a convergence in the physical requirements of the two sports, and of course swimming differs. In the nature of its practice, it differs from other sports.

As for the two sports (fencing and equestrian), each of them is characterized by the fact that the player does not control the performance alone. In fencing, there is the player's thought and a corresponding thought from his opponent. The player must anticipate the movements made by the opponent and try to read them to confront them, while equestrianism is characterized by the presence of a thought and a thought that complements it, and each Both of them try to control, and despite the difference in the nature of the human mind and the horse's mind, their goal is the same, which is to overcome obstacles. (27: 9-15)(32: 97-99)

Through the researcher's review of the measurement forms for the sport of modern pentathlon, he noticed that the measurement tests provided to the players are standardized, and most coaches do not take into account the scientific foundations in selecting players, even though each sporting activity has its own determinants (morphological, physiological, physical). Rather, they rely largely on personal experience. This is not a scientific method or a correct way to select a player, but rather a waste of all elements and a waste of time and money, and this may sometimes lead to a lack of development in the level. By informing the researcher of the reference studies that dealt with the research and study of the determinants of selecting modern pentathlon players, the researcher found that The modern pentathlon sport was not included in a scientific study in terms of determining their biological characteristics, so the researcher conducted this study to determine the biological characteristics of the modern pentathlon players.

Search goal: This research aims to identify the biological characteristics (morphological - physiological - physical) of modern pentathlon players.

Research questions:

1- What are the distinctive morphological characteristics of modern pentathlon players?

2- What are the distinctive physiological characteristics of modern pentathlon players?

3- What are the distinctive physical characteristics of modern pentathlon players?

Definitions used in the research:

- **Biological characteristics of modern pentathlon players:*** It is the set of morphological, physiological and physical characteristics characteristic of modern pentathlon players.

Reference studies:

Arabic reference studies

1- A study by Ahmed Farouk Azab Al-Shafi'i (2007) (6) entitled "Biological and psychological determinants for selecting junior karatekas." The researcher used the descriptive approach on a sample of (16) kata players in the Sunni stage over (16) years, (18).) years, and physical measurements, physiological tests, and a measure of psychological traits designed by the researcher were used as a means of collecting data. The researcher arrived at the most important physical measurements and physiological and psychological variables that must be taken into account when selecting a karateka (kata).

2- Badia Abdel Samie's study (2003) (10) entitled "The Distinctive Biological and Physical Determinants of Female Pole Vaulters," and the researcher used the descriptive approach on a sample of (10) female competitors representing the entire population of female pole vault competitors who participated in the Republic Championships under (20). years, and used physical and physiological measurements and physical tests as means of collecting data. The most important results were that the anthropometric measurements of pole vault competitors were reached, which are (total height, contracted upper arm circumference, leg length, thigh length, body weight, chest circumference), as well as physiological variables. Represented by (blood glucose concentration, pyruvic acid concentration), and physical determinants represented by (great muscular strength, speed,

* **Operational definition**

strength characterized by speed, agility, flexibility).

3- A study by Iqbal Rasmi Muhammad Muhammad (2002) (9) entitled "Biological characteristics of female synchronized swimming players and their relationship to the level of performance." It aimed to identify the biological characteristics of female synchronized swimming players and their relationship to the level of performance. The researchers used the descriptive approach, and the research sample was intentionally composed of female athletes. Synchronized swimming: 34 female athletes aged between 17-20 years. The most important results were that it was possible to build a battery to select female synchronized swimming players based on physical, functional and physical measurements.

4- Hassan Abdullah Ahmed Abd Rabbo (2002) (13) conducted a study entitled "Some Biological Characteristics of Track Runners in the Republic of Yemen." The study aimed to determine some biological characteristics (physical, physical, physiological) as well as to develop a battery to select track athletes for short and medium distances. And Al-Taweelah in the Republic of Yemen. The researcher used the descriptive approach, and the research sample reached (50) players from first-class clubs who are registered in the records of the Yemeni Athletics Federation with high numbers. The study resulted in the following most important results: Extracting a selection battery for short, medium and long distances for track racers, where It included (9) measurements and tests for short distances and (18) tests and measurements for medium and long distances.

Foreign reference studies:

1- A study by Scott, M. & French, E (1991) (31) entitled "Morphological characteristics of high-level field hockey players." The researcher used the descriptive approach on a sample of (30) first-class international players in England, and the researcher used physical measurements. And physiological as a means of collecting data. The most important results were that the average height of international players was (176.30) cm, weight (75.20) kg. The study also showed the importance of arm length, leg length, right and left fist strength, which reached (54) kg for the right, (53) kg for the left hand.

2- A study by Gil, et all (2007) (28) entitled "Functional and

physical characteristics of emerging football players in light of playing positions and their relationship to the selection process," where this study used the descriptive approach on a sample of (241) players representing all playing positions. Height, weight, skin fold thickness, fat percentage, bone and muscle percentage, absolute and relative vital capacity, and maximum absolute and relative oxygen consumption were also measured. The variables of speed, agility and flexibility were also measured, and the most important results of this study were the distinctive characteristics of each position on the field.

Research Methodology: The researcher used the descriptive method as it suits the nature of the research.

The research sample:

The research sample included a number of (50) modern pentathlon players (first division) at the City Club in the city of Benha, who are registered with the Egyptian Modern Pentathlon Federation, and whose ages range between (17 and 19) years. A number of (20) players were also used to conduct the study. Thus, the research sample became (70) players.

Sample homogeneity:

(1) Table

Homogeneity of the research sample members in terms of chronological age and training age, n = 70

Skewness	Std. Deviation	Median	Mean	Variables
0.29-	0.79	18.00	18.16	Chronological age
0.36-	0.69	4.00	4.24	Training age

It is clear from Table (1) that the values of the skewness coefficients in the variables of chronological age and training age ranged between (-0.36, 0.29), which values are limited to ±3, which indicates the homogeneity of the data for the individuals in the research sample.

Data collection tools and methods:

Tools and devices used in the research: attached (2)

Tools used in the research:

- Measuring tape.
- Adhesive tape.
- Stop watch.
- Chair without back.
- Tennis balls.
- Wooden box, 40 cm high.
- Medicine ball.
- Basketball.
- 30 cm ruler.
- Rubber rope.
- Thread.
- Funnels.
- Flat table.

Devices used in the research:

- inbody device.
- Belvometer to measure symptoms.
- Skinfold Caliper thickness measuring device.
- Stethoscope.
- Sphygmomanometer.
- Dry spirometer.
- Oximeter device to measure the level of oxygen in the blood.
- Manometer device to measure grip strength.
- A device consisting of two wooden circles lined with leather and placed horizontally.
- A device consisting of a board with a crossbar fixed in the middle, 18 inches long and 6 inches high.

Forms used in the research:

Data registration form: Attachment (3)

Expert opinion poll form to determine the biological determinants that are appropriate to the nature of the research. Attachment (4)

Biological measurements used in research: Attachment (5)

Determine the biological research variables (morphological, physiological, and physical):

Through the reference survey, the researcher was able to extract a set of biological variables (morphological, physiological, and physical), and then put them in a form to be presented to the experts, attached (4), through a personal interview.

Then the biological variables (morphological - physiological - physical) were identified, the relative importance of which was limited to (77.77: 100%). The most important measurements extracted by the researcher will be presented **in the following presentation:**

Morphological measurements:

Weight in kilograms.	Fat percentage.	BMI.

Lengths:

- The total length of the body in centimeters.
- Trunk length (upper limb length).
- Foot length.
- Arm length.
- Humerus length.
- Forearm length.
- Length of the lower limb.
- Thigh length.
- Leg length (tibia).

Oceans:

- Chest circumference (normal).
- Chest circumference (inhalation).
- Chest circumference (exhale).
- Middle circumference.
- Pelvic
- Grip

circumference circumference.
- Thigh circumference
- Calf circumference.

Symptoms:
- Shoulder width.
- Chest width.
- Pelvic width.

Skin fold thickness:
- Thickness of the skin folds below the pelvic bone.
- Thickness of the skin folds at the chest.
- Thickness of the skin folds at the abdomen.
- Thickness of the skin folds at the middle of the thigh

(7: 124-144), (18: 51-72), (19: 91-107), (20: 30-34)

Physiological measurements:
- Pulse rate (rest - exertion).
- Systolic blood pressure (rest - exertion).
- Diastolic pressure (rest - exertion). (3: 67-70)
- Vital capacity. (30: 61)
- O2 percentage. (3: 67-69)

Physical measurements:
- Testing the bending of the arms from a horizontal position (muscular endurance).
- Vertical jump from standing with knees bent in half (muscular endurance).
- Right grip strength test (muscle strength).
- Left fist strength test (muscle strength).
- Broad jump test of stability (muscular strength).
- Test of throwing a medicine ball the maximum distance (muscular strength).
- Static balance test (balance).
- Right arm ball balance test (balance).
- Left arm ball balance test (balance).
- Multi-faceted running test (agility).
- Movement of the arm in the horizontal direction (speed).
- Testing the leg's movement in the horizontal direction (speed).
- Testing bending the torso forward from standing (flexibility).
- Parallel barbell sitting test (flexibility).
- Testing aiming by hand on overlapping circles (accuracy).
- Throwing and receiving balls test (compatibility). (5: 115) (16: 27)(19: 209, 347, 348) (23: 362)

Exploratory study: The exploratory study was conducted from Tuesday, April 12, 2022 to Thursday, April 21, 2022, with a sample of (20) players represented in the exploratory sample, **in order to ensure:**

- The extent of understanding and clarity of measurements.

- Calculating scientific transactions (validity - reliability).

Scientific parameters for the tests used under research:

Validity and reliability of research Tools:

With regard to the validity and stability of measurements of biological variables (morphological - physiological - physical), the devices used to measure these variables are honest and stable and are considered relative standards. They have a high degree of accuracy, and the possibility of error in them is very small, as the researcher made sure of their safety before using them. And also to ensure the accuracy of the results before entering them into the computer for statistical processing, by applying and re-application with a time interval of (10) days between the two applications, where a sample of (20) individuals was taken, represented by the exploratory sample with the same tests, under the same conditions, and using the same The tools, and Table (2) shows the reliability coefficients for the tests under study. The subjective validity of these measurements was also calculated, as pointed out by Muhammad Nasr al-Din Radwan (2011, p. 216)(21), by calculating the square root of the test reliability coefficient as in the following equation:

Intrinsic validity = $\sqrt{\text{reliability}}$

Table (2)

Results of Pearson correlation coefficients for the significance of the relationship between the first and second application and self-honesty, n=20

Intrinsic validity	"R" value	Second application		First application		Variables	
		Std. Deviation	Mean	Std. Deviation	Mean		
0.990	**0.981	1.76	75.15	1.92	75.10	Weight in kilograms	Morphological measurements
0.988	**0.976	1.01	22.70	1.02	22.68	Fat percentage	
0.937	**0.878	0.64	24.63	0.62	24.48	BMI	
0.999	**0.999	1.28	173.79	1.28	173.80	Total body length in centimeters	
0.998	**0.996	0.98	81.90	0.97	81.92	Torso length (upper limb length)	
0.993	**0.986	0.80	81.61	0.79	81.64	Arm length	
0.999	**0.999	0.75	37.58	0.74	37.58	Humerus length	
0.999	**0.999	1.10	36.29	1.09	36.30	Forearm length	

Follow Table (2)
Results of Pearson correlation coefficients for the significance of the relationship between the first and second application and self-honesty, n=20

Intrinsic validity	"R" value	Second application		First application		Variables	
		Std. Deviation	Mean	Std. Deviation	Mean		
0.994	**0.988	0.67	92.56	0.66	92.58	Length of the lower limb	
0.979	**0.958	0.36	50.27	0.35	50.30	Thigh length	
0.998	**0.997	1.07	41.20	1.05	41.21	Leg length (shin)	
0.995	**0.990	0.75	26.88	0.73	26.90	Foot length	
0.989	**0.978	0.82	85.70	0.77	85.77	Chest circumference (normal)	
0.969	**0.939	0.84	92.76	0.75	92.89	Chest circumference (inhalation)	
0.980	**0.961	0.77	84.76	0.75	84.81	Chest circumference (exhale)	
0.875	**0.766	0.32	75.15	0.35	75.26	Center circumference	
0.995	**0.991	0.75	84.63	0.72	84.67	Pelvic circumference	
0.977	**0.955	0.37	26.28	0.36	26.30	Grip circumference	
0.964	**0.929	0.77	55.68	0.73	55.64	Thigh circumference	
0.997	**0.994	0.74	42.83	0.73	42.84	Calf circumference	
0.998	**0.997	0.75	40.63	0.74	40.64	Shoulder width	
0.997	**0.994	1.16	30.09	1.14	30.11	Chest width	
0.792	**0.628	0.80	26.81	0.78	26.83	Pelvic width	
0.784	**0.615	0.37	6.32	0.36	6.48	The thickness of the skin folds below the pelvic bone	
0.947	**0.897	0.39	6.37	0.34	6.55	Thickness of skin folds at the chest	
0.845	**0.714	0.78	6.92	0.60	7.12	Thickness of the skin folds at the abdomen	
0.948	**0.899	0.35	6.50	0.29	6.60	Thickness of the skin folds at the middle of the thigh	
0.940	**0.883	2.06	66.45	2.02	66.10	Comfort pulse	Physical measurements
0.977	**0.955	2.15	183.30	2.20	183.00	Effort pulse	
0.989	**0.978	1.90	116.45	1.97	116.25	Resting systolic blood pressure	
0.993	**0.987	2.70	166.45	2.78	166.20	Systolic blood pressure exertion	
0.966	**0.934	1.11	78.80	1.14	78.60	Resting diastolic blood pressure	
0.990	**0.981	2.19	71.45	2.28	71.20	Diastolic blood pressure exertion	
0.739	*0.546	0.22	2.05	0.37	2.15	Vital capacity	
0.933	**0.871	1.30	93.70	1.15	93.95	O2 percentage	
0.973	**0.947	1.08	8.00	1.14	8.15	Bend arms test (muscular endurance)	
0.930	**0.865	0.81	6.65	0.75	6.85	Vertical jump standing with knees half bent (muscular endurance)	
0.989	**0.979	2.08	37.00	2.17	37.25	Right grip strength test (muscle strength)	

Follow Table (2)
Results of Pearson correlation coefficients for the significance of the relationship between the first and second application and self-honesty, n=20

Intrinsic validity	"R" value	Second application		First application		Variables
		Std. Deviation	Mean	Std. Deviation	Mean	
0.990	**0.980	2.18	30.35	2.06	30.60	Left fist strength test (muscle strength)
0.825	**0.680	0.16	1.79	0.11	1.85	Broad jump test of stability (muscular strength)
0.956	**0.914	0.65	4.38	0.51	4.53	Test of throwing a medicine ball for the maximum distance (muscular strength)
0.922	**0.850	8.24	75.00	8.85	76.20	Static balance test (balance)
0.932	**0.868	0.88	3.65	0.85	3.90	Right arm ball balance test (balance)
0.756	**0.572	0.37	2.85	0.49	2.65	Left arm ball balance test (balance)
0.943	**0.889	0.67	9.65	0.53	9.85	Multi-faceted running test (agility)
0.982	**0.965	2.23	19.35	2.17	19.20	Arm movement in the horizontal direction (speed)
0.974	**0.948	1.27	12.40	1.27	12.60	Testing the movement of the leg in the horizontal direction (speed)
0.952	**0.907	0.81	9.35	1.02	9.10	Trunk forward bending test from standing (flexibility)
0.940	**0.883	1.31	24.65	1.39	24.35	Parallel barbell sitting test (flexibility)
0.954	**0.910	0.86	6.70	1.05	6.95	Test of aiming by hand on overlapping circles (accuracy)
0.909	**0.826	0.83	16.45	0.75	16.15	Throwing and receiving balls test (compatibility)

**There is a correlation at the 0.01 level; Where the value of (R) is at the level of 0.01 at the degree of freedom (19) = 0.549
*There is a correlation at the 0.05 level; Where the value of (R) is at the level of 0.05 at the degree of freedom (19) = 0.433

It is clear from the results of Table (2) that the Pearson correlation coefficient for the reliability of the variables under study is statistically significant at the significance level ($a \leq 0.05$), where its value ranged between (0.546, 0.999), and the self-reliability value ranged between (0.739, 0.999), and such The results indicate that the research variables have a high degree of reliability and validity and meet the purposes of the research.

Basic study:

The basic study was conducted by applying the biological measurements under study (morphological, physiological, physical) to the basic research sample, which consisted of (50) modern pentathlon players at the City

Club in Benha, who are registered with the Egyptian Modern Pentathlon Federation, during the period from Monday, 2/25/2022 AD until Wednesday, 5/11/2022 AD.

Statistical treatments: The researcher used the following statistical treatments:

- SMA.
- standard deviation.
- "R" value.
- Self-honesty.
- Mediator.
- Torsion coefficient.
- Flatness coefficient.
- Factor analysis.
-

Presentation and discussion of results:

Factor analysis of morphological, physiological and physical measurements:

Factor analysis is a statistical approach to analyzing multiple data that are linked to each other with different degrees of correlation and in the form of independent classifications based on qualitative foundations for classification, as follows:

The researcher presents the remaining procedures to extract the final factors, starting with presenting the statistical description of the most important morphological, physiological and physical measurements nominated for factor analysis, as shown in the following presentation:

First: Display the results:

Show the results of the first question:

Which states: What are the distinctive morphological characteristics of modern pentathlon players?

Table (3)

Statistical description of the most important morphological characteristics of modern pentathlon players "research sample", n=50

Kurtosis	Skewness	Std. Deviation	Median	Mean	Variables	
2.09	1.74-	2.00	76.00	74.94	Weight in kilograms	Morphological measurements
1.15	1.61	1.00	22.05	22.61	Fat percentage	
1.87	1.66	0.62	24.10	24.43	BMI	
0.80	0.56-	1.26	174.00	173.80	Total body length in centimeters	
0.22	1.26	1.05	81.65	81.93	Torso length (upper limb length)	
0.42-	1.02	0.76	81.00	81.58	Arm length	
0.39-	1.11	0.72	37.08	37.52	Humerus length	
1.09-	0.70	1.08	35.64	36.15	Forearm length	
0.26	1.22	0.65	92.43	92.52	Length of the lower limb	

Follow Table (3)
Statistical description of the most important morphological characteristics of modern pentathlon players "research sample", n=50

Kurtosis	Skewness	Std. Deviation	Median	Mean	Variables
0.02-	1.14	0.35	50.17	50.27	Thigh length
1.02-	0.77	1.07	40.47	41.04	Leg length (shin)
1.21-	0.60	0.74	26.48	26.78	Foot length
0.86-	0.82	0.77	85.48	85.66	Chest circumference (normal)
1.26-	0.50	0.75	92.64	92.78	Chest circumference (inhalation)
1.19-	0.59	0.74	84.28	84.70	Chest circumference (exhale)
0.80	1.42	0.34	75.00	75.24	Center circumference
0.55-	0.98	0.71	84.38	84.59	Pelvic circumference
0.26-	0.97	0.35	26.00	26.28	Grip circumference
0.41-	1.02	0.71	55.37	55.57	Thigh circumference
1.20-	0.56	0.73	42.47	42.73	Calf circumference
0.36-	1.08	0.72	40.38	40.57	Shoulder width
0.98-	0.76	1.12	29.39	29.96	Chest width
1.17-	0.71	0.77	26.47	26.71	Pelvic width
1.42-	0.25	0.36	6.36	6.48	The thickness of the skin folds below the pelvic bone
1.55-	0.13-	0.34	6.38	6.56	Thickness of skin folds at the chest
1.21-	0.05	0.68	6.89	7.03	Thickness of the skin folds at the abdomen
0.62-	0.61-	0.29	6.70	6.60	Thickness of the skin folds at the middle of the thigh

Table (3) shows the descriptive statistics (arithmetic mean, median, standard deviation, coefficient of skewness, coefficient of kurtosis), and the number of sample members (50) for (27) variables (weight in kilograms, fat percentage, body mass index, total body length). In cm, torso length "upper limb length", arm length, upper arm length, forearm length, lower limb length, thigh length, leg length "shin", foot length, chest circumference "normal", chest circumference "inhalation", chest circumference "Exhale", waist circumference, pelvic circumference, fist circumference, thigh circumference, calf circumference, shoulder width, chest width, pelvis width, thickness of the skin folds below the pelvic bone, thickness of the skin folds at the chest, thickness of the skin folds at the abdomen, thickness Skin folds at the middle of the thigh), and the coefficient of torsion and flatness were limited to (±3), which indicates the moderate distribution of data in the sample.

Attachment (6) shows the matrix of intercorrelations, or squares, for the

distinctive morphological characteristics of the modern pentathlon players, which is the first solution to the relationships between the variables included in the factor analysis. It is also clear from the same attachment that the commonness values for the distinctive morphological variables of the modern pentathlon players (the research sample) ranged from Between (0.733, 0.975).

Table (4)
Total Variance Explained

Extraction Sums of Squared Loadings			Initial Eigenvalues			Morphological measurements
Cumulative %	% of Variance	Total	Cumulative %	% of Variance	Total	
46.131	46.131	12.455	46.131	46.131	12.455	1
60.636	14.505	3.916	60.636	14.505	3.916	2
69.777	9.141	2.468	69.777	9.141	2.468	3
75.940	6.163	1.664	75.940	6.163	1.664	4
80.485	4.544	1.227	80.485	4.544	1.227	5
84.428	3.943	1.065	84.428	3.943	1.065	6
			87.713	3.285	0.887	7
			90.379	2.667	0.720	8
			92.511	2.131	0.575	9
			94.124	1.613	0.436	10
			95.434	1.310	0.354	11
			96.692	1.258	0.340	12
			97.714	1.022	0.276	13
			98.321	0.606	0.164	14
			98.814	0.493	0.133	15
			99.146	0.332	0.090	16
			99.437	0.291	0.079	17
			99.656	0.218	0.059	18
			99.811	0.155	0.042	19
			99.906	0.095	0.026	20
			99.974	0.069	0.019	21
			100.000	0.026	0.007	22
			100.000	3.886E-15	1.049E-15	23
			100.000	1.977E-15	5.337E-16	24
			100.000	-4.337E-16	-1.171E-16	25
			100.000	-2.155E-15	-5.818E-16	26
			100.000	-5.195E-15	-1.403E-15	27

.**Extraction Method:** Principal Component Analysis

Table (4) shows the extraction of (6) factors with values (latent root) greater than the correct one. The percentages of explaining the variances from the total variance for each factor separately were also reached, and the six factors reveal a percentage of (84.428%). This is a high percentage, and the values are (Eigenvalues) is a criterion for each component of the variance it can reveal. The higher the value (Eigenvalues), the greater the variance that is explained or revealed by the factor.

Table (5)
Component Matrix[a]

Component						Morphological measurements
6	5	4	3	2	1	
					0.894	Weight in kilograms
					0.890	Fat percentage
					0.883	BMI
					0.879	Total body length in centimeters
					0.869	Torso length (upper limb length)
					0.867	Arm length
				0.329-	0.862	Humerus length
					0.860	Forearm length
					0.840	Length of the lower limb
				0.354-	0.826	Thigh length
				0.365-	0.819	Leg length (shin)
				0.316	0.772	Foot length
				0.500	0.690	Chest circumference (normal)
				0.555	0.684	Chest circumference (inhalation)
				0.548-	0.625	Chest circumference (exhale)
			0.369	0.438-	0.592	Center circumference
0.523				0.518	0.571	Pelvic circumference
0.300		0.486		0.445-	0.504	Grip circumference
0.375				0.611	0.554	Thigh circumference
			0.665	0.505-	0.379	Calf circumference
			0.651	0.476		Shoulder width
			0.636	0.522-	0.354	Chest width
			0.565	0.420	0.358	Pelvic width
		0.545	0.345-	0.395-	0.349	The thickness of the skin folds below the pelvic bone
0.346-	0.386	0.504			0.503	Thickness of skin folds at the chest
	0.683		0.348	0.377	0.321	Thickness of the skin folds at the abdomen
	0.457-	0.417	0.394		0.455	Thickness of the skin folds at the middle of the thigh

Extraction Method: Principal Component Analysis.

a. 6 components extracted.

Table (5) shows the factor matrix after rotation, which includes (6) factors.

The rule is that any factor that has relationships greater than 0.30 with three or more variables can be considered a good component to take into account, and in cases of (overload) we take the larger value, **and accordingly we note from the table above that:**

- The first factor has strong relationships with 26 out of 27 variables.
- The second factor has strong relationships with 17 out of 27 variables.
- The third factor has strong relationships with 8 variables out of 27 variables.
- The fourth factor has strong relationships with 4 variables out of 27 variables.
- The fifth factor has strong relationships with 3 variables out of 27 variables.
- The sixth factor has strong relationships with 4 variables out of 27 variables.

Show the results of the second question:

Which states: What are the distinctive physiological characteristics of modern pentathlon players?

Table (6)

Statistical description of the most important physiological characteristics of modern pentathlon players "research sample"

Kurtosis	Skewness	Std. Deviation	Median	Mean	Variables	
1.08-	0.71	3.41	65.00	67.70	Comfort pulse	Physiological measurements
1.63-	0.58	3.52	182.00	184.76	Effort pulse	
0.44-	0.88	3.39	115.00	117.72	Resting systolic blood pressure	
0.88-	0.83	5.24	165.00	168.92	Systolic blood pressure exertion	
1.29	1.31	2.06	78.00	79.50	Resting diastolic blood pressure	
1.17-	0.69	3.79	70.00	73.00	Diastolic blood pressure exertion	
1.81-	0.51	0.49	2.00	2.38	Vital capacity	
1.60-	0.52	2.12	94.00	95.10	O2 percentage	

Table (6) shows the descriptive statistics (arithmetic mean, median, standard deviation, skewness coefficient, skewness coefficient), and the number of sample members (50) for (8) variables (resting pulse, exertion pulse, resting systolic blood pressure, systolic blood pressure). Effort, resting diastolic blood pressure, exertion diastolic blood pressure, vital capacity, O2 percentage), and the coefficient of skewness and kurtosis was limited to (±3), which indicates the

moderate distribution of data in the sample.

Attachment (6) shows the intercorrelations matrix, or square, for the distinctive physiological characteristics of modern pentathlon players, which is the first solution to the relationships between the variables included in the factor analysis.

Table (7)
Results of the Kaiser-Meyer-Olkin test and Bartlett's test (KMO)

0.868	**Kaiser-Meyer-Olkin Measure of Sampling Adequacy.**	
1282.508	Approx .Chi-Square	Bartlett's Test of Sphericity
28	Df	
0.000	Sig.	

Table (7) shows the results of the KMO measurement quality assurance test:

From the table above we note that the value of (Kaiser-Meyer-Olkin KMO) is equal to 0.868, which is an acceptable value since the minimum value for that value is 0.600, and this means that the measurement is excellent and the degree of significance of the measurement is 0.000.

It is also clear from Appendix (6) that the prevalence values of the physiological variables characteristic of the modern pentathlon players, the "research sample," ranged between (0.919, 0.996).

Table (8)
Total Variance Explained

Extraction Sums of Squared Loadings			**Initial Eigenvalues**			**Physiological measurements**
Cumulative %	**% of Variance**	**Total**	**Cumulative %**	**% of Variance**	**Total**	
95.972	95.972	7.678	95.972	95.972	7.678	1
			98.607	2.634	0.211	2
			99.340	0.734	0.059	3
			99.687	0.347	0.028	4
			99.870	0.183	0.015	5
			99.961	0.091	0.007	6
			99.988	0.027	0.002	7
			100.000	0.012	0.001	8

.Extraction Method: Principal Component Analysis

Table (8) shows the extraction of factor (1) only with its (latent root) values greater than the correct one. The percentages of explaining the variances from the total variance of each factor separately and the six factors revealed a percentage of (95.972%), and this is a high percentage. Eigenvalues are a criterion for each component regarding the variance it can reveal. The higher the Eigenvalues, the greater the variance that is explained or revealed by the factor.

Table (9)
Component matrix

Component 1	Physiological measurements
0.997	Comfort pulse
0.991	Effort pulse
0.974	Resting systolic blood pressure
0.994	Systolic blood pressure exertion
0.961	Resting diastolic blood pressure
0.998	Diastolic blood pressure exertion
0.963	Vital capacity
0.958	O2 percentage
.Extraction Method: Principal Component Analysis	
.a. 1 components extracted	

Table (9) shows the factor matrix, which includes only one factor. The rule is that any factor that has relationships greater than 0.30 with three or more variables can be considered a good component to take into account, and in cases of (overload) we take the largest value, and accordingly we note from the table above The first factor has strong relationships with the eight variables under study.

Show the results of the third question:

Which states: What are the distinctive physical characteristics of modern pentathlon players?

Table (10)
Statistical description of the most important physical characteristics of modern pentathlon players "research sample"

Kurtosis	Skewness	Std. Deviation	Median	Mean	Variables	
0.45	0.65	1.13	8.00	7.90	Bend arms test (muscular endurance)	Physical measurements
1.89	0.87	0.70	7.00	6.92	Vertical jump standing with knees half bent (muscular endurance)	
1.09-	0.56	2.09	36.50	37.02	Right grip strength test (muscle strength)	
1.63	0.20	1.83	30.00	30.48	Left fist strength test (muscle strength)	
0.49	0.01-	0.11	1.90	1.85	Broad jump test of stability (muscular strength)	
1.14-	0.39-	0.59	4.60	4.53	Test of throwing a medicine ball for the maximum distance (muscular strength)	
0.95-	0.29-	8.81	80.00	76.54	Static balance test (balance)	
0.36-	0.54-	0.84	4.00	4.06	Right arm ball balance test (balance)	
1.81-	0.51-	0.49	3.00	2.62	Left arm ball balance test (balance)	
0.08	0.09-	0.68	9.73	9.82	Multi-faceted running test (agility)	

Follow Table (10)
Statistical description of the most important physical characteristics of modern pentathlon players "research sample"

Kurtosis	Skewness	Std. Deviation	Median	Mean	Variables
2.16	1.32	1.93	19.00	19.16	Arm movement in the horizontal direction (speed)
1.16-	0.24-	1.31	13.00	12.58	Testing the movement of the leg in the horizontal direction (speed)
1.41-	0.27	1.16	9.00	9.44	Trunk forward bending test from standing (flexibility)
1.22	0.14-	1.70	24.00	24.02	Parallel barbell sitting test (flexibility)
0.38-	0.54-	1.25	7.00	6.98	Test of aiming by hand on overlapping circles (accuracy)
1.84	1.65	0.66	16.00	16.12	Throwing and receiving balls test (compatibility)

Table (10) shows the descriptive statistics (arithmetic mean, median, standard deviation, coefficient of torsion, coefficient of flatness), and the number of sample members (50) for (16) variables: (bending the arms from horizontal prone, "muscular endurance", vertical jump from standing) With the knees bent in half, "muscular endurance," right fist strength, "muscular strength," left fist strength, "muscular strength," standing broad jump, "muscular strength," throwing a medicine ball the maximum distance, "muscular strength," static balance, "balance," balance. Ball "right arm" "balance", ball balance "left arm" "balance", multi-directional running "agility", movement of the arm in the horizontal direction "speed", movement of the leg in the horizontal direction "speed", bending the torso forward from standing "flexibility" ", sitting on a parallel bar "flexibility", aiming with the hand on overlapping circles "accuracy", throwing and receiving balls "compatibility", and the coefficient of torsion and flatness was limited to (±3), which indicates the moderate distribution of data in the sample.

Attachment (6) also shows that the intercorrelations matrix, or square, is the first solution to the relationships between the variables included in the factor analysis.

Table (11)
Results of the Kaiser-Meyer-Olkin test and Bartlett's test (KMO)

0.382	.Kaiser-Meyer-Olkin Measure of Sampling Adequacy	
432.146	Chi-Square .Approx	Bartlett's Test of Sphericity
120	Df	
0.000	.Sig	

Table (11) shows the results of the KMO measurement quality assurance test:

From the table above we note that the value of (Kaiser-Meyer-Olkin KMO) is 0.382, and the significance degree of the measurement is 0.000.

It is clear from Appendix (6) that the prevalence values of the physical variables characteristic of the modern pentathlon players, "the research sample." The prevalence values of the variables ranged between (0.592, 0.918).

Table (12)
Total Variance Explained

Rotation Sums of Squared Loadings			Extraction Sums of Squared Loadings			Initial Eigenvalues			Physical measurements
Cumulative %	% of Variance	Total	Cumulative %	% of Variance	Total	Cumulative %	% of Variance	Total	
15.290	15.290	2.446	21.041	21.041	3.366	21.041	21.041	3.366	1
28.733	13.443	2.151	36.555	15.515	2.482	36.555	15.515	2.482	2
41.931	13.198	2.112	50.011	13.456	2.153	50.011	13.456	2.153	3
54.900	12.969	2.075	59.458	9.447	1.512	59.458	9.447	1.512	4
67.737	12.837	2.054	68.422	8.964	1.434	68.422	8.964	1.434	5
76.957	9.221	1.475	76.957	8.535	1.366	76.957	8.535	1.366	6
						82.822	5.865	0.938	7
						87.440	4.618	0.739	8
						91.121	3.681	0.589	9
						94.091	2.970	0.475	10
						95.920	1.830	0.293	11
						97.420	1.500	0.240	12
						98.491	1.071	0.171	13
						99.338	0.847	0.135	14
						99.784	0.446	0.071	15
						100.000	0.216	0.035	16

.Extraction Method: Principal Component Analysis

Table (12) shows the extraction of (6) factors with values (latent root) greater than the correct one. The percentages of explaining the variances from the total variance for each factor separately were also reached, and the six factors reveal a percentage of (76.957%). This is a high percentage, and the values are considered (Eigenvalues) is a criterion for each component of the variance it can reveal. The higher the value (Eigenvalues), the greater the variance that is explained or revealed by the factor.

Table (13)
Component matrix

Component						Physical measurements
6	5	4	3	2	1	
					0.763	Bend arms test (muscular endurance)
					0.754	Vertical jump standing with knees half bent (muscular endurance)

Follow Table (13)
Component matrix

Component						Physical measurements
6	5	4	3	2	1	
					0.653	Right grip strength test (muscle strength)
	0.315			0.763-		Left fist strength test (muscle strength)
	0.438			0.635		Broad jump test of stability (muscular strength)
0.361			0.325	0.587	0.460	Test of throwing a medicine ball for the maximum distance (muscular strength)
0.361-				0.567	0.489-	Static balance test (balance)
0.303		0.425		0.557	0.404-	Right arm ball balance test (balance)
	0.391-		0.762			Left arm ball balance test (balance)
0.521			0.740-			Multi-faceted running test (agility)
			0.632	0.521-		Arm movement in the horizontal direction (speed)
		0.707-		0.306	0.491	Testing the movement of the leg in the horizontal direction (speed)
	0.344	0.527-	0.409		0.407-	Trunk forward bending test from standing (flexibility)
	0.640-				0.544-	Parallel barbell sitting test (flexibility)
	0.573	0.312-			0.555-	Test of aiming by hand on overlapping circles (accuracy)
0.667						Throwing and receiving balls test (compatibility)

.Extraction Method: Principal Component Analysis

.a. 6 components extracted

Table (13) shows the factor matrix, which includes (6) factors.

The rule is that any factor that has relationships greater than 0.30 with three or more variables can be considered a good component to take into account, and in cases of (overload) we take the larger value, and accordingly we note from the table above that:

- The first factor has strong relationships with 10 out of 16 variables.
- The second factor has strong relationships with 7 variables out of 16 variables.
- The third factor has strong relationships with 5 variables out of 16 variables.
- The fourth factor has strong relationships with 4 variables out of 16 variables.
- The fifth factor has strong relationships with 6 variables out of 16 variables.
- The sixth factor has strong relationships with 5 variables out of 16 variables.

Table (14)
Rotated Component Matrix[a]

Component						Physical measurements
6	5	4	3	2	1	
					0.845	Bend arms test (muscular endurance)
0.321		0.310-			0.749	Vertical jump standing with knees half bent (muscular endurance)
	0.323-		0.431		0.458-	Right grip strength test (muscle strength)
				0.857	0.355-	Left fist strength test (muscle strength)
				0.667-	0.529-	Broad jump test of stability (muscular strength)
			0.476	0.630		Test of throwing a medicine ball for the maximum distance (muscular strength)
	0.339-			0.554		Static balance test (balance)
			0.898-			Right arm ball balance test (balance)
	0.527-		0.599		0.330-	Left arm ball balance test (balance)
0.369-			0.555		0.507	Multi-faceted running test (agility)
		0.815				Arm movement in the horizontal direction (speed)
0.383		0.813-				Testing the movement of the leg in the horizontal direction (speed)
0.417		0.647				Trunk forward bending test from standing (flexibility)
	0.861					Parallel barbell sitting test (flexibility)
	0.837					Test of aiming by hand on overlapping circles (accuracy)
0.774						Throwing and receiving balls test (compatibility)

.Extraction Method: Principal Component Analysis
.Normalization Rotation Method: Varimax with Kaiser

.a. Rotation converged in 8 iterations

Table (14) shows the factor matrix after rotation, which includes (6) factors.

The rule is that any factor that has relationships greater than 0.30 with three or more variables can be considered a good component to take into account, and in cases of (overload) we take the larger value, **and accordingly we note from the table above that:**

- The first factor has strong relationships with 7 variables out of 16 variables.

- The second factor has strong relationships with 4 variables out of 16 variables.
- The third factor has strong relationships with 5 variables out of 16 variables.
- The fourth factor has strong relationships with 4 variables out of 16 variables.
- The fifth factor has strong relationships with 5 variables out of 16 variables.
- The sixth factor has strong relationships with 5 variables out of 16 variables.

Discussion of results:

Discussing the results of the first question:

Which states: What are the distinctive morphological characteristics of modern pentathlon players?

It is clear from Table (3) that the arithmetic average of weight in kilograms (74.94), fat percentage (22.61), body mass index (24.43), total body length in centimeters (173.80), torso length (upper limb length) (81.93), and arm length (81.58), upper arm length (37.52), forearm length (36.15), lower limb length (92.52), thigh length (50.27), leg length (41.04), foot length (26.78), chest circumference (normal) (85.66), chest circumference (inhalation) (92.78), chest circumference (exhalation) (84.70), waist circumference (75.24), pelvic circumference (84.59), fist circumference (26.28), thigh circumference (55.57), calf circumference (42.73), shoulder width (40.57), chest width (29.96), pelvis width (26.71), skin fold thickness below the pelvic bone (6.48), skin fold thickness at the chest (6.56), skin fold thickness at the abdomen (7.03), Thickness of skin folds at mid-thigh (6.60).

Table (4) shows the extraction of (6) factors with (latent root) values greater than the correct one. The percentages of explaining the variances from the total variance for each factor separately were also reached, and the six factors reveal a percentage of (84.428%). This is a high percentage, and the values are considered (Eigenvalues) is a criterion for each component of the variance it can reveal. The higher the value (Eigenvalues), the greater the variance that is explained or revealed by the factor. Table (5) also shows the factor matrix after rotation, **which includes (6) factors:**

- The first factor has strong relationships with 26 out of 27 variables.
- The second factor has strong relationships with 17 out of 27 variables.
- The third factor has strong relationships with 8 variables out of 27 variables.
- The fourth factor has strong relationships with 4 variables out of 27 variables.

- The fifth factor has strong relationships with 3 variables out of 27 variables.
- The sixth factor has strong relationships with 4 variables out of 27 variables.

Ahmed Abdel Salam Hegazy (1983), citing Rarik, points out that the bones of the limbs that are most used in exercise are longer and wider than other bones that are not used to a large extent in exercise. (4: 10)

Abu Al-Ela Ahmed Abdel-Fattah (1997), citing Tymanin, emphasizes the importance of the lengths of body parts due to their connection to the length of the body's levers, as this is reflected in the level of performance. (1: 24)

Issam Abdel Khaleq (1999) confirms that sports training leads to an increase in the physiological cross-section of the muscles, and the larger the physiological cross-section of the muscle, the greater the muscle strength. Therefore, measuring circumferences is considered an important variable for the benefit of high-level players because of its impact on the amount of force that can be produced during... Skilled performance. (14: 99)

Wilmore & Costil (1994) also point out that, in general, the lower the body fat, the better the physical performance, as it is the degree of obesity that negatively affects physical performance, not the total body weight. The higher the percentage of fat, the lower the physical performance. It is an inverse relationship. (33: 390)

This is consistent with the study of Ahmed Farouk Azab Al-Shafi'i (2007) (6), Badi'a Ali Abdul Sami Muhammad (2003) (10), Iqbal Rasmi Muhammad Muhammad (2002) (9), and Hassan Abdullah Ahmed Abd Rabbo (2002).)(13), Scott, M. & French, E (1991) (31), Gil, et all (2007) (28).

The researcher believes that the most important morphological determinants that can be relied upon as determinants of selection in modern pentathlon have been extracted, and from here the first question has been answered.

Discussing the results of the second question:

Which states: What are the distinctive physiological characteristics of modern pentathlon players?

It is clear from Table (6) that the arithmetic mean of resting pulse (67.70), exertion pulse (184.76), resting systolic blood pressure (117.72), exertion systolic blood pressure (168.92), resting diastolic blood pressure (79.50), and exertion diastolic blood pressure (73.00), vital capacity (2.38), oxygen O2 percentage (95.10), and as Table (7) shows, the value of (Kaiser-Meyer-Olkin KMO) equals 0.868, which is an acceptable value since the minimum value for that value is 0.600, and this This means that the measurement is excellent and the

significance level of the measurement is 0.000.

Table (8) also shows the extraction of factor (1) only with its (latent root) value greater than the correct one. The percentages of explaining the variances from the total variance for each factor separately and the six factors revealed a percentage of (95.972%), and this is a high percentage. Eigenvalues are a criterion for each component of the variance it can reveal. The higher the Eigenvalues, the greater the variance that is explained or revealed by the factor.

Table (9) also shows the factor matrix, which includes only one factor. The rule is that any factor that has relationships greater than 0.30 with three or more variables can be considered a good component to take into account, and in cases of (overload) we take the largest value, and accordingly we note from the table Above, the first factor has strong relationships with the eight variables under investigation.

Abu Al-Ela Ahmed Abdel Fattah (1998) and Fox (1979) point out that the pulse rate increases during sports activity, and this increase is related to the intensity of the effort exerted. (2: 58)

Bahaa El-Din Salama (2000) indicates that the resting pulse rate ranges between 60-80 N/min in healthy people. (11: 52)

Both Muhammad Hassan Allawi and Abu Al-Ala Ahmed Abdel Fattah (1984) confirm that physical exertion leads to an increase and rise in blood pressure as a result of an increase in the size of the frontal push as a result of the participation of large muscle groups in performance. (17: 210)

This is consistent with the study of Ahmed Farouk Azab Al-Shafi'i (2007) (6), Badi'a Ali Abdul Sami Muhammad (2003) (10), Iqbal Rasmi Muhammad Muhammad (2002) (9), and Hassan Abdullah Ahmed Abd Rabbo (2002). (13), Gil, et all (2007) (28).

The researcher believes that the most important physiological determinants that can be relied upon as determinants of selection in modern pentathlon have been extracted, and from here the second question has been answered.

Discussing the results of the third question:

Which states: What are the distinctive physical characteristics of modern pentathlon players?

It is clear from Table (10) that the arithmetic mean for the horizontal arm bending test (muscular endurance) is (7.90), the vertical jump from standing with the knees half bent (muscular endurance) (6.92), the right grip strength test (muscular strength) (37.02), Left grip strength test (muscular strength) (30.48), stationary broad jump test (muscular strength) (1.85), maximum distance medicine ball throw test (muscular strength) (4.53), static balance test (balance)

(76.54), test Right arm ball balance (balance) (4.06), left arm ball balance test (balance) (2.62), multi-directional running test (agility) (9.82), arm movement in the horizontal direction (speed) (19.16), Test of leg movement in the horizontal direction (speed) (12.58), torso bending forward from standing test (flexibility) (9.44), parallel leg sitting test (flexibility) (24.02), hand aiming test on overlapping circles (accuracy) (6.98), test Throwing and receiving balls (compatibility) (16.12).

Table (11) shows the value of (Kaiser-Meyer-Olkin KMO) equal to 0.382, and the degree of significance of the measurement is 0.000.

Table (12) also shows the extraction of (6) factors with values (latent root) greater than the correct one. The percentages of explaining the variances from the total variance for each factor separately were also reached, and the six factors reveal a percentage of (76.957%), and this is a high percentage, and it is considered a high percentage. Eigenvalues are a criterion for each component regarding the variance it can reveal. The higher the Eigenvalues, the greater the variance that is explained or revealed by the factor. **Table (13) shows the factor matrix, which includes (6) factors:**

- The first factor has strong relationships with 10 out of 16 variables.
- The second factor has strong relationships with 7 variables out of 16 variables.
- The third factor has strong relationships with 5 variables out of 16 variables.
- The fourth factor has strong relationships with 4 variables out of 16 variables.
- The fifth factor has strong relationships with 6 variables out of 16 variables.
- The sixth factor has strong relationships with 5 variables out of 16 variables.

Table (14) shows the factor matrix after rotation, which includes (6) factors:

- The first factor has strong relationships with 7 variables out of 16 variables.
- The second factor has strong relationships with 4 variables out of 16 variables.
- The third factor has strong relationships with 5 variables out of 16 variables.
- The fourth factor has strong relationships with 4 variables out of 16 variables.
- The fifth factor has strong relationships with 5 variables out of 16 variables.
- The sixth factor has strong relationships with 5 variables out of 16 variables.

Wajih Ahmed Shamandi (1995), citing Verkhechanesky, points out that in the sports field, physical qualities or

abilities must be interconnected with the components of good technical performance, as the effectiveness of sports skill improvement is essentially linked to the process of coordination between the art of performance with methods of training physical qualities or physical preparation of athletes. Skillful preparation is related to learning a movement or skill, and physical preparation is related to training physical qualities. (25: 265)

Tawfiq Ibrahim (2007) adds that physical preparation plays an effective role in player preparation programs, as it is considered a means that leads to raising the level of general and specific physical fitness in proportion to the nature of performance in order to reach the best possible athletic level, which leads to achieving the best results. (12: 2)

This is consistent with the study of Iqbal Rasmi Muhammad Muhammad (2002)(9), Hassan Abdullah Ahmed Abd Rabbo (2002)(13), Gil, et all (2007)(28).

The researcher believes that the most important physical determinants that can be relied upon as determinants of selection in modern pentathlon have been extracted, and from here the third question has been answered.

Conclusions: In light of the goal of the research, what the researcher found from the statistical method used, and what the research resulted in, **the researcher drew the following conclusions:**

1- The morphological determinants that can be relied upon as selection determinants in the modern pentathlon sport were extracted, which are (weight in kilograms, fat percentage, body mass index, total body length in centimeters, torso length (upper limb length), arm length, upper arm length, forearm length). , lower limb length, thigh length, leg length (shin), foot length, chest circumference "normal", chest circumference "inhale", chest circumference "exhale", waist circumference, pelvic circumference, fist circumference, thigh circumference, circumference Calf calf, shoulder width, chest width, pelvic width, thickness of the skin folds below the pelvic bone, thickness of the skin folds at the chest, thickness of the skin folds at the abdomen, thickness of the skin folds at the middle of the thigh.

2- All of (resting pulse, exertion pulse, resting systolic blood pressure, resting systolic blood pressure, resting diastolic blood pressure, exertion diastolic blood pressure, vital capacity, O2 ratio) contribute to identifying the functional efficiency of the circulatory system, which is an important criterion. For selection in modern pentathlon.

3- The elements of physical fitness that can be relied upon in selection for the sport of modern pentathlon have been extracted (muscular endurance, muscular strength, balance, agility, speed, flexibility, accuracy,

compatibility), and the best tests for them have also been identified, which can be developed in the form of a physical test battery. For modern pentathlon players.

Recommendations:

In light of the research objectives and questions, the sample on which the study was conducted, and based on the results and statistical treatments, **the researcher recommends the following:**

1- The biological determinants (morphological-physiological-physical) that resulted from the current study are among the most important foundations that are taken into account when selecting the modern pentathlon sport, especially the national teams.

2- Conducting similar studies at different stages of the process in other sports.

3- The need to pay attention to coordinating work in the field of sports training among coaches.

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