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THE EFFECT OF CRITICAL SPEED EXERCISES ON BLOOD OXYGEN LEVELS AND CONSUMPTION IN YOUNG FOOTBALL PLAYERS

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ABSTRACT

The sporting level that we are currently witnessing, and which the majority of countries in the world have reached, must be the result of scientific progress that depends on the results of research and studies conducted in several fields and sciences. The wheel of development will not stop, but studies are still ongoing and continuing to this day for the purpose of obtaining the best. Modern training methods and means that show the best level of achievements and sports performance.

Football is one of the group games that requires players to practice it with various physical abilities, especially those that enable them to perform various physical movements and special skills for the game. Critical speed exercises are among the modern training methods used in training at higher levels. The study aimed to prepare exercises in speed training. Critical speed exercises identification of the effects of critical speed. Some exercises are helpful for training purposes physiological variables (the percentage of O2 consumption and the percentage of O2 in the blood). The hypothesis of the current study was that there is an effect of critical speed exercises in developing some physiological variables: the percentage of oxygen consumption and the percentage of oxygen in the blood. The research sample was young players. Karbala Football Club. The researcher used the experimental approach to the research.

Keywords: *Speed exercises and blood oxygen*.

INTRODUCTION

The sporting level that we are currently witnessing, and which the majority of countries in the world have reached, must be the result of scientific progress that depends on the results of research and studies conducted in several fields and sciences. The wheel of development will not stop, but studies are still ongoing and continuing to this day for the purpose of obtaining the best. Modern training methods and means that show the best level of achievements and sports performance.

The majority of sports sciences have entered the field of training to enhance the level of performance. and skills, as well as developing achievement correctly in a way that serves the type of sports game practiced by the player, where the science of sports training and physiology overlap to influence the achievement of the desired sports level. Football is one of the group games that requires players to practice it with various physical abilities, especially those that enable them to perform various physical movements and special skills for the game.[1] Critical speed exercises are among the modern training methods used in training higher levels. Therefore, the importance of this current study is to use the concept of critical speed for the purpose of building special training vocabulary and demonstrating the extent of the influence of this type of method on some functional variables of young football players, to raise the level of achievement.

Research problem

The game of football is one of the mass competitions practiced by the majority of players, which depends on anaerobic capabilities in addition to its reliance on aerobic capabilities. Most studies that deal with the problems of sports training have confirmed the specificity of anaerobic training, but they have not confirmed the existence of training exercises for aerobic training. In particular, no reference was made to the application of training for these abilities according to the term critical speed and the use of training intensity, which is one of the modern methods that have not entered into application. For this reason, some solutions have been developed to the problem of declining levels of young football players, especially in recent years, so the researcher used aerobic training. According to the critical speed and the possibility of knowing its effect on the functional variables that occur as a result of the use of these exercises and their effectiveness in aerobic training, which ensures their use in games characterized by the use of anaerobic training.

Research objectives

1. Preparing exercises to develop critical speed.
2. In this study, we sought to investigate the impact of critical speed exercises on enhancing certain physiological factors. (the percentage of O2 consumption and the percentage of O2 in the blood).

Research hypothesis

- There is an effect of critical speed exercises in developing some physiological variables, such as the percentage of oxygen consumption and the percentage of oxygen in the blood.

Research field

- Human field: Karbala Youth Sports Club.
- Time frame: 1/5/2024 to 3/5/2024.
- Spatial field: Karbala Club Stadium.

Research Methodology

Each research has a specific scientific method through which one can reach the best way to solve the problem to be studied, which constitutes the research. For this reason, the researcher used the experimental method because it is the most appropriate method to solve the research problem that he wants to study. “The experimental method accepts a distinct method that is best understood and assimilated.” [2]An aspect of comparison, by proving the existence of clear evidence that includes comparison between groups, and the researcher believes that the nature of the research problem is what determines the research methodology, and for this reason the researcher used the experimental design in the style of equal control and experimental groups with a pre- and post-test.

Research community

The research community was identified by the researcher, and they were the players of the Karbala Youth Club, and their number reached (22) players. Then the researcher divided the research community into two groups, experimental and control, and then the researcher, by drawing lots, consisted of (10) players, so that the first group was experimental and the other was control. Then the researcher carried out homogeneity and equality between the two groups in the

study variables, which are (height, age, mass, training age, O2 consumption, and the percentage of O2 consumption in the blood, as shown in Table (1).

Table 1. The skewness coefficient for the variables under study demonstrates the homogeneity of the research sample

Variables	Units	Control group	Experimental group	(F) Value	(F) Tabulated	Indication
		mean	mean			
Body mass	Kg	17.6776	15.7662	1.02	7.34	Non sig.
Height	Meter	0.002492	0.003169	3.34		Non sig.
Age time	Year	29.22	53.65	1.74		Non sig.
Training age	Year	8.69	14.79	1.70		Non sig.
Oxygen consumption	Ml/Kg/Min.	41.46	52.3	1.21		Non sig.
Oxygen consumption rate	Ml/Kg/Min.	1.22	0.67	1.73		Non sig.
Critical speed	Meter/Sec.	28470.15	148886.39	6.22		Non sig.

Methods, tools and devices used in research.

- Personal interviews.
- Observation.
- Testing and measurement.
- Medical scale.
- Height measuring device.
- Stopwatch (3) of German origin.
- A device to measure blood oxygen levels before and immediately after exertion.
- Electronic calculator.

Search procedures

1. **Research tests: The** researcher surveyed many sources and tests and consulted experts and specialists in the field of the game of football - sports training and sports physiology. In addition to the experience that the researcher gained through playing the game of football, the tests were determined as follows:
- Critical speed test.
- Incline running test.
- Measure the level of O2 in the blood.
2. Description of the research tests:

First: Testing the player's critical speed[3]

- The objective of the examination is to assess and quantify the player's highest air speed.
- Test specifications: The tester runs for a continuous period of (20) minutes, and the researcher and assistant start timing the player and recording the distance from the starting point until the end of (20) minutes for all tested players for one time only.
- How to register: The distance traveled by the testers (km) and its parts are calculated.

Second: The mile running test[4]

- The objective of the examination is to assess and quantify a player's oxygen consumption percentage.
- Test specifications: The tester runs continuously over a distance (a mile) of approximately (1600 meters). The researcher and his assistants time when the testers start running from the beginning of the starting point. The clock will stop at the end of the specified distance, as all players will be tested together for one time. .
- How to record: The time was calculated in minutes and their parts, and the time achieved by the tested players is compared according to a table prepared for this purpose, which will show the researcher and the testers the amount of VO2max consumption ml/kg per minute.

Third: Measure the level of oxygen in the blood[5]

- Purpose of measurement: directly measuring the O2 level in the blood.

- Measurement specifications: The testers must be in a state of calm, with the device held in the index finger of one hand, and the researcher, assistant, or tester presses the button for reading the device, and then the reading is taken from it.
- Recording: The reading taken from the device for reading the O2 percentage was recorded

3. **Pretests:** The researcher conducted cardiac tests on a research sample of Karbala Youth Club players, and to ensure the accuracy of the results that the researcher will obtain and their development through the training program that he prepares in terms of critical speed exercises and their relationship to the percentage of oxygen as well as the percentage of oxygen consumption, the researcher conducted this test in two days, where The critical speed test was conducted on Sunday, 1/7/2024 On Monday, January 8, 2024, a tilt test was performed to measure the percentage of O2 consumption and to measure the percentage of O2 in the blood.

Research exercises

The researcher prepared his exercises for the topic of his research on the basis of the pre-tests that were applied based on some scientific sources and references in addition to the viewpoints of professionals and specialists. in sports and physiological training. The exercises included:

- 12 training units, 3 training units per week.
- The duration of one training unit ranges from (70-110) minutes.
- The exercises through one training unit consisted of giving repetitions to the players according to high intensity and based on the critical speed test for the players.
- Rest was calculated based on the ratio of work to rest (1:1).
- The application of the special exercises in the research was completed on Saturday, 3/2/2024.
- The research sample underwent the exercises during a designated preparation period.

4. **Post-tests:** After administering the specialized exercises to both the experimental and control groups, the researcher proceeded to conduct post-tests on the research sample experimental group for Monday and Tuesday, corresponding to 4-5/3/2024 at exactly three-thirty in the afternoon in the holy Karbala stadium after the exercises had been carried out, where The researcher was keen to use the same method in the pre-tests of the research, and also, as much as possible, to provide the same conditions and requirements in terms of time, place, and tools used.

Results and discussion

- **Presenting, analyzing and discussing the results of the critical speed variable for the control and experimental groups**
  - In this presentation, we will discuss the methods employed and the outcomes observed when comparing the pre-test and post-test results regarding the critical speed variable for the control and experimental groups, analyzing and discussing them.

Table 2. Shows the means, the standard deviations, the significance of the differences between the results of the pre- and post-tests in the critical speed variable for the two experimental control groups can be determined by analyzing the difference of the means and their standard deviation, as well as the calculated (t) value

Physical variables	Groups	Units	Pretest		Posttest		(t) value	Indication
			mean	STD	mean	STD		
Critical speed	Control	Meter/ Sec.	5403.00	169.831	5636.00	217.745	4.234	Sig.
	Experimental		5645.70	384.847	6409.24	413.056	12.922	Sig.

In the critical speed test: The means for the control and experimental groups of the research sample in the pre-test for the control group reached (5403.00) and (5645.70) for the experimental group, with a standard deviation of (169.831) for the control group and (384.847) for the experimental group, while the means were in The post-test for the control group was (5636.00) and (6409.24), with a standard deviation for the control group of (217.745) and (413.056) for the experimental group, which indicates the significance of the results of the post-test revealed notable distinctions between the control and experimental groups, suggesting a substantial shift from the pretest.

Whereas the tests have shown that there is a mutual and noticeable effect between the achieved amounts of development in the overall physical abilities related to the game of football, which was greatly emphasized during the exercises prepared by the researcher on the basis of air speed (critical speed), as the development in the results of these tests indicated that the effect of exercises based on aerobic speed was effective in developing the movements of the legs and arms and the correct control over them for the players.[6]

- **Presenting, analyzing, and discussing the results of the two functional variables for the control and experimental groups:**
  - Presenting the means and the results of the differences between the results of the pre- and post-tests for the two functional variables for the control and experimental group, analyzing and discussing them

Table 3. Shows the means, the standard deviations, the calculated t-value, significance of differences, and the standard deviation of the means between the pre- and post-tests in the two functional variables were analyzed for both the experimental and control groups.

Functional variables	Groups	Units	Pretest		Posttest		mean diff.	STD diff.	(t) value	Indication
			mean	STD	mean	STD				
Oxygen consumption	Control	Ml/Kg/Mi.	68.601	8.369	76.401	3.229	7.260	2.964	5.722	Sig.
	Experimental		92.460	1.148	92.01	0.737	7.840	4.865	3.677	Sig.
O2 level in the blood	Control	Ml/Kg/Min	91.802	0.846	93.630	0.558	0.620	0.578	2.479	Sig.
	Experimental		76.450	4.517	76.801	5.353	1.900	1.089	3.573	Sig.

The outcomes of the oxygen consumption test revealed that the average values for the control and experimental groups in the pre-test were recorded at 68.601 and 8.369, respectively, with a standard deviation of 7.260. Conversely, the post-test results displayed average values of 76.401 with a standard deviation of 3.229. Furthermore, the difference in means between the pre- and post-test results for both the control and experimental groups was 7.260 and 7.840, respectively, with standard deviations of 2.964 and 4.865. The calculated t values for the tests were 5.722 and 3.677, signifying the significance of the post-test results, which demonstrated a substantial difference in favor of both the control and experimental groups when compared to their respective pre-test scores.

The results showed in the O2 test in the blood: The results showed that the means for the control and experimental groups in the pre-test were (91.802) and (76.450), with a standard deviation shown by the results of (1.089) and (0.578), while the results showed that the means in the test Post-test (93.630) and (76.801). The results showed that the standard deviations reached (0.620) and (0.578), the contrast between the pre- and post-tests in the control group highlights the random nature of the differences, while the significance of the differences in the experimental group strongly favors the post-test. It was found that this variable, the percentage of oxygen consumption of the player, increases its importance, and this is a determinant of excellence and achievement, as the other opinion says that there is a link between the high amount of (O2) that football players possess, and the player's physical performance and the amount of physical fitness he possesses, as The percentage of O2 consumption in the body actually represents the body's maximum ability to receive and transport (O2) and then extract it into the player's working muscle cell.[7] The factors that determine (O2) are among the factors (the player's skeletal muscles), as the central factors of the circulatory and nervous systems that determine The ability of voluntary muscles to consume O2 during training. It was found that the exercises that were applied to the research group and the experimental group contributed to the development of the peripheral and central factors of the player's body in a way that is proportional to the effort of the game, which made the results of the differences in this variable significant for the members of this group and better than the control group for the research.[8]

Conclusions

1. There is a noticeable and positive development in the physical variable between the pre- and post-tests, in favor of the experimental research group.
2. There is a positive effect on the physical variable (critical speed), in favor of the experimental research group
3. There is a noticeable and positive development in the two functional variables between the pre- and post-tests, in favor of the experimental research group.
4. It was found that there was no improvement for the control group in the functional variable, O2 consumption ratio
5. There is a positive and significant effect size in the two functional variables as well as the physical variable, in favor of the experimental research group according to the sequence (O2 percentage in the blood, critical speed, O2 consumption.

Recommendations

1. Emphasis on the use of critical speed exercises
2. Emphasis on conducting continuous periodic tests to determine the extent of the players' development rate and the suitability of using this type of exercise during the training sessions.

3. The necessity of using critical speed exercises in the special preparation period and the period before competitions to serve the type of game practiced.
4. The researcher recommends using this type of exercise with age groups (such as men, Olympic, and junior) because of its impact on the development of the player's physical and physiological capabilities.

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