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The Effect Of Exercises Similar To Competitive Performance On The Skills Of Passing And Dribbling And Oxygen Saturation (Spo2) Among Junior Handball Players

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Abstract

The novelty of the study is that it aims to determine the effect of task-oriented exercises that simulate competitive play on the passing/dribbling skill along with the arterial oxygen saturation (SpO2) of junior handball players and it is hoped that it would provide insights on the integration training modules to meet both the technical and physiological requirements.The research problem can be briefly formulated as the lack of empirical data on the extent of the impact that competition-style exercises have on passing and dribbling, and also on SpO 2 in junior handball players; a gap in the knowledge is still not filled properly.The goals of the current study were (a) to develop competitive-type drills that are expected to improve passing, dribbling, and SpO 2 in junior handball players, and (b) to test the outcome of such drills on the above outcome variables.The experimental design was taken with the treatment (experimental) group and a comparison (control) group because this study methodology was considered suitable to answer the research problem.The group of the study involved the youth division of the Naft Maysan Club that included 16 athletes aged 16-17. A random sample population of 12 players was extracted out of this population and was further divided into experimental and control groups comprising of six each. Two subjects were not included in the primary project: one of them was conducted as preliminary pilot study, and the other one was excluded because of his position as a goalkeeper.Statistical tests were performed in SPSS 26 and the results obtained had a number of significant results. First among them was the fact that the competitive-style exercises dramatically improved passing skills as the accuracy and time spent to execute the pass were significantly higher than those of the control group. Likewise, the level of dribbling skills enhanced in the experimental group and was manifested by a significant reduction in the duration of dribbling, which shows a higher level of ball-handling and faster motor reactions during the defense and time-pressure-related situations.The researchers obtained a number of practical implications: (1) introduction of the drills of the competitive style in the program of youth handball training under the influence of realistic game situations to both enhance the development of technical competence and physiological conditioning; (2) use of progressive approach to intensity and duration within the weekly training blocks to ensure the proper balance of physical load and recovery; and (3) the priority of progressive adaptation to maximise skill acquisition and physiological benefits.

Keywords: Exercises Similar To Competitive Performance, Passing, Tapping, Oxygen Saturation (Spo2).

Introduction

Sports are among the most prominent human activities that play a fundamental role in enhancing the physical, mental, and social health of individuals. They contribute to the development of basic physical abilities such as strength, speed, endurance, and flexibility, as well as enhancing mental and psychological abilities such as discipline, focus, and self-confidence. Additionally, they have a social role in promoting the spirit of cooperation and teamwork. Team sports, especially handball, are among the games that require a combination of individual and collective skills. Good performance relies on the coordination of physical ability, technique, and tactical planning during matches. This makes systematic and planned training a fundamental factor in developing players' levels, especially in the emerging age groups that are in the stage of physical, technical, and psychological formation, which is a crucial phase for building the foundations of future athletic performance.

Recent studies in sports training sciences have shown that using exercises similar to competitive performance, known as situational training similar to play, represents an effective method for developing both technical and physical performance simultaneously. These exercises allow for the simulation of actual game situations, increase skill accuracy, speed up decision-making processes, and improve the level of physical and mental engagement of players during matches. Among the fundamental skills in handball, the skills of passing and dribbling stand out, as they are central to ball control, building attacks, and executing individual and team strategies. Accurate passing contributes to better ball control during both offense and defense, while dribbling aids in ball control while moving and facilitates more effective team play.

In addition, the physiological aspect of factors affecting athletic performance is an important element that cannot be ignored. Blood oxygen saturation (SpO2) is a vital indicator of respiratory and circulatory efficiency, helping to assess players' ability to endure intense physical exertion without early fatigue. It also reflects the overall endurance level of the body during training and competition, and is considered an important tool for determining the effectiveness of various training methods on young players.

The importance of the research lies in understanding the impact of exercises similar to competitive performance on the skills of passing and dribbling, as well as oxygen saturation (SpO2) among junior handball players. This aims to provide comprehensive training methods that combine both skill and physiological aspects, contributing to the improvement of players' technical and physical performance. Additionally, it offers coaches and researchers a scientific basis to develop effective training programs that meet the needs of the junior age group, ensuring the enhancement of individual and collective efficiency and achieving better results in sports performance.

1.2 Problem Research

Despite the significant role of exercises similar to competitive performance in developing the basic skills of handball players, the extent of these exercises' impact on passing and dribbling

skills and oxygen saturation (SpO2) among junior players remains unclear. Understanding the relationship between these exercises and the improvement of technical performance and physiological capacity is essential for developing scientific training programs that help enhance ball control, speed of performance, and decision-making accuracy during matches. Studying this relationship also provides coaches and researchers with a solid scientific foundation to design more effective exercises that meet the needs of the emerging age group, and contribute to raising the level of physical and skill performance of players in a comprehensive manner, which enhances the chances of achieving better results in sports competitions and ensures the comprehensive and sustainable development of players.

1.3 Research Objectives

- Preparing exercises similar to competitive performance to develop passing and dribbling skills and oxygen saturation (SpO2) among junior handball players. Preparing exercises similar to competitive performance to develop the skills of passing, dribbling, and oxygen saturation (SpO2) among junior handball players.
- Identifying the impact of exercises similar to competitive performance on the skills of passing, dribbling, and oxygen saturation (SpO2) among junior handball players. Identifying the impact of exercises similar to competitive performance on the skills of passing and dribbling and oxygen saturation (SpO2) among junior handball players.

1.4 Research Hypotheses

- As indicated, there are statistically significant differences between the pre and post-test scores of both the experimental and control groups, where the post test scores have the definitive advantage. The results of the pre- and post-tests of these groups are statistically significant, and the result of post-tests shows a positive impact.
- The statistical analysis indicates that the post-test scores of the experimental and control groups are statistically different with the favor of experimental group.

1.5 Areas of Research

1.5.1 Human field: Players of the Maysan Oil Club junior handball team.

1.5.2 Spatial domain: Al-Shaheed Saad Khalaf Subuf Hall.

1.5.3 Temporal scope: from 28/6/2024 to 31/8/2024.

2. Research Methodology

In scientific research, picking the right approach is crucial, since it needs to match the character of the subject. In addition, the technique that the researcher uses to solve the study problem is dictated by the issue that is being examined. Since this study was experimental in nature, the researcher used a two-group design consisting of equivalent groups to administer tests before and after the intervention. By "an endeavor to regulate all fundamental factors influencing the dependent variable or variables in the experiment, with the exception of one

variable manipulated by the researcher in a specific manner to ascertain and quantify its impact on the dependent variable or variables" (Al-Shouk and Al-Kubaisi 2004, 59), the experimental method is defined.

2.1 Research Population and Sample

The scholar decided the research population as the members of Naft Maysan handball club that incorporate the players of the youth category (below 17 years of age) during the 2024-2025 season of training in the club, whose the number of players will be (16). A research sample was selected and it entailed (14) players without the goalkeepers. Then the players were applied randomly in two different groups (control and experimental groups) of respectively (6) players, two players were to be excluded during the pilot study. Table (1) shows the results of applying a skewness coefficient to the research sample members' height, weight, chronological age, and training age in order to guarantee that the research sample members were homogeneous.

Table 1: It shows the homogeneity of the research sample

Variables	Unit of measurement	mean	median	St.d	skewness
Height	Cm	175.62	174.5	3.30	0.12
Weight	Kg	74.43	74	2.98	0.09
Chronological age	Year	16.25	16.5	0.85	- 0.54
Training age	Year	3.12	3	0.88	0.39

2.2 The means, devices, and tools used

- Interview, observation, questionnaire, test.
- Performance evaluation forms.
- Laptop computer type (DELL).•
- Canon 2900 laser printer.
- One timer clock of SONY brand.
- Whistle.
- Measuring tape.
- Planning tape, 5 cm wide.
- 5 flags.
- Chair with a height of (40c)
- Pulse oximeter.
- Football field.
- Handballs (10).
- Mobile camera type I PHONE 14 PRO MAX.

2.3 Field research methodologies

2.3.1 The tests used

First: The Handling Test (Mutab 2004, 139)

- **Test name**: Execute a 30-second overhead forehand pass from a distance of 3 meters, following an oval trajectory against a wall.
- **The evaluation's goal**: Measuring passing skill
- **Tools used**: A wall with an oval shape drawn on it, with dimensions (diameter 60 cm, length 100 cm, height from the ground 60 cm, meaning the height from the ground to the end of the oval shape is 160 cm), 7 handballs, a measuring tape, a stopwatch, and adhesive tape.
- **Performance method**: Positioned three meters from the wall, the player faces a line marked on the ground. Upon the word "start," the player passes the ball from head level to the oval shape drawn on the wall multiple times within 30 seconds.
- **Scoring**: The number of correct passes against the wall and catches is counted, and the ball bouncing off the ground is not considered a correct attempt.

Secondly: Taptap Test (Darwish 2002, 118)

- **Test name**: Taptap test for a distance of 30m on a zigzag line.
- **The purpose of the test**: Measuring dribbling speed
- **Tools used**: handball, stopwatch, 5 cones, recording forms.
- **Performance method**: The player stands in front of the 9-meter line holding the ball, and upon the start signal, the player dribbles and zigzags around the flags back and forth.
- **Conditions:** The test is performed by allowing one valid attempt, and the test is repeated for any legal error.
- **Score calculation**: The total time is calculated in seconds for the round trip.

Third: Oxygen saturation test (SpO2) (SN 1996, 139)

- **Pre-test arrangements**: Participants are informed not to drink tea or coffee on the day of the test.
- **The devices used**: A pulse oximeter was used, which is considered a modern and approved device for measuring oxygen saturation in many specialized clinical laboratories, and its results are highly accurate. The unit of measurement is the percentage (%), and the chair height is 40 cm.
- **Method of conducting the test**: After exerting an effort of (15 minutes), (Spo2) was evaluated by having the player sit on a chair with a height of (40 cm) such that the feet are touching the ground, the back is leaning against the back of the chair in an upright position, the arms are raised in front of the body at a (90-degree) angle without support, and inserting the thumb into the testing device for (3) seconds or

more until the result stabilizes on the device screen to know the (Spo2) percentage. And figure (1) illustrates this.

- **Method of recording**: The values displayed on the device screen, which represent the blood oxygen level, are recorded.

Figure 1:The pulse oximeter device for testing oxygen saturation is shown

2.3.2 The Pilot Study

The pilot study is a crucial preliminary research phase that investigators should contemplate prior to commencing the primary experimental endeavor. Consequently, every researcher must undertake such a study to assess the appropriateness of instruments, equipment, and evaluation procedures for the intended sample, while also identifying potential limitations and methodological deficiencies in test implementation, the duration necessary to complete each test, and the composition of the support team. Hashim (2012, p. 95) defines a pilot research as a small-scale experimental investigation, serving as a preliminary and training study intended to refine field practices prior to large data gathering. The author conducted the pilot experiment on Thursday, June 28, 2024, selecting volunteers from their own community, apart from the primary sample. The experiments were conducted in the hall of martyr Saad Khalaf Suwaif prior to the commencement of the primary research, aiming to achieve the following objectives:

- Identification and rectification of any issues that may arise during the primary experiment, as well as validation of the suitability of the study site for the sample population. Determination of the most advantageous timing for each test included in the research .
- The precision and dependability of the employed instruments and devices are confirmed.
- The safety and well-being of the test subjects are considered .

- Assessment of the efficacy and quantity of the support personnel.

2.3.3 Pre-tests

The researcher and the aiding team administered the pre-tests before to initiating the training program. These tests included the three variables under study at exactly 4 PM on Thursday, 4/7/2024, in the hall of the martyr Saad Khalaf Swaif. The equivalence was extracted thru the tests as shown in Table (2).

Table 2: It shows the equivalence of the research groups

Tests	Unit of measurement	Experimental group		Control group		t. test	sig	The indication
		mean	St.d	mean	St.d			
The handling	degree	10.16	1.16	10.50	1.04	0.52	0.61	Insig
The patting	sec	14.48	0.92	15.16	0.72	1.40	0.18	Insig
(SpO2)	%	92.78	1.07	93.10	0.53	0.64	0.53	Insig

• Not significant at the 0.05 significance level and 10 degrees of freedom.

2.3.4 The main experiment

Following the completion of the pre-tests, the exercises were implemented only for the experimental group throughout the training sessions, commencing on Saturday, June 7, 2024, and concluding on Wednesday, August 28, 2024, at the hall of Martyr Saad Khalaf Sweif. After reviewing the sources, references, and literature on sports training, exercises similar to competitive performance were designed and incorporated into the training units in the main section, with the aim of studying the impact of these exercises on the development of the passing and dribbling skills and the physiological variable (SpO2) under study among the members of the experimental group.

The exercises were conducted with three training sessions per week on Saturdays, Mondays, and Wednesdays, allowing for a balanced distribution of training load while providing appropriate recovery periods suitable for the nature of the emerging age group. The exercises were designed based on the principle of realistic simulation of match conditions, as they included mini-game situations, graduated spaces, defensive pressure, and quick transitions from defense to attack, with a focus on skill performance under conditions resembling actual competitive play.

The prepared exercises were implemented at the beginning of the main section of the training unit, taking into account the gradual increase in training load from week to week, whether in terms of performance time, number of repetitions, or level of skill complexity, in line with the team's overall training plan. As for the intensity of the performance, it depended on the nature of the game-like exercises, which ranged between 75% and 90% of the maximum heart rate,

depending on the preparation phase, with monitoring of the players' physiological responses to ensure achieving positive adaptations without reaching excessive fatigue.

The exercises included game situations (3 against 3) and (4 against 4) in specific areas, passing drills under time and defensive pressure, dribbling drills with changes in direction and speed, in addition to quick offensive transition situations that require executing passing and dribbling with high efficiency. This contributes to improving ball control, decision-making speed, and skill performance accuracy, as well as enhancing the efficiency of the circulatory and respiratory systems, which positively reflects on blood oxygen saturation levels (SpO2).

The exercises were designed progressively, with the duration and volume of the exercises gradually increasing from the second week to the eighth week, while maintaining a competitive performance character to ensure the development of the two skills under study and achieving physiological adaptations suitable for the nature of handball matches, which are characterized by continuous changes in effort intensity. This program is suitable for the research sample, as it combines skill and physical development within a realistic competitive framework that reflects the nature of the match, with an emphasis on performing at maximum speed and high accuracy during work periods.

The number of training units reached (24) training units, and the time spent on these exercises varied from week to week. The duration of these exercises began to increase from the second week to the eighth week, with the total exercise time over the (8) weeks amounting to (549 minutes). Table (3) illustrates this.

Table 3: It shows the duration of exercises in a single training unit, in one week, and the total duration of exercises over (8) weeks

Weeks / **Times**	**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**The total time for the special exercises over (10) weeks**
The duration of exercises in a single training unit	15 min	18 min	20 min	22 min	24 min	26 min	28 min	30 min	
The time for exercises in one week	45 min	54 min	60 min	66 min	72 min	78 min	84 min	90 min	549 min

2.3.5 Post-tests

Following the conclusion of the primary experiment, which spanned 8 weeks, the researcher administered post-tests to the research sample (comprising both experimental and control groups) on Saturday, August 31, 2024. He adhered to the same methodology employed for the pre-tests and ensured that all conditions and requirements for the pre-tests were satisfied during the post-tests regarding time, location, and testing instruments to guarantee the validity of the results.

2.4 Statistical Methods

The researcher utilized the statistical software (SPSS 26) to obtain the subsequent values:

Mean, standard deviation, median, skewness, independent samples t-test, one-sample t-test, mean differences, standard error, degrees of freedom, significant level.

3. Presentation, analysis, and discussion of the results

3.1 Presentation of the pre-test and post-test results for the experimental group:

Table 4: It shows the results of the pre-test and post-test for the experimental group

Tests	Unit of measurement	Pre-tests		Post-tests		F	F *h	t. test	Sig	The indication
		mean	St.d	mean	St.d					
The handling	degree	10.16	1.16	15.83	0.75	5.66	0.42	13.44	0.000	Sig
The patting	sec	14.48	0.92	11.76	0.55	2.72	0.55	4.17	0.005	Sig
(SpO2)	%	92.78	1.07	98.67	0.75	5.89	0.66	4.18	0.000	Sig

Table (4) clearly shows that the experimental group's handling test results improved after the pre-test. The average pre-test score was 10.16 degrees, with a standard deviation of 1.16, whereas the average post-test score was 15.83 degrees, with a standard deviation of 0.75. The average difference between the experiments was 5.66 degrees, with a 0.42 standard error. The t-test yielded a t-value of 13.44, which is significant given the significance level of 0.000 and degrees of freedom of 5, which are below 0.05. This shows that the discrepancies were considerable and helped the experimental group post-test.

For the experimental group, there were statistically significant changes between the pre- and post-test results, with the post-test coming out on top in the tap test. After the exam, the participants' times improved from 14.48 to 11.76 seconds, with a standard deviation of 0.55 compared to 0.92 before the test. There was a 2.72 second mean difference and a 0.55 standard error of the difference between the two tests. With degrees of freedom equal to 5, which is less than 0.05, the computed t-value of 4.17 from the statistical analysis using the t-

test is significant. This is because the test's significance threshold was 0.005, which is lower than the significance level of 0.05. This means that the differences were significant and helped the experimental group on their post-test.

In the experimental group's SpO2 evaluation, pre-test and post-test results differ statistically, favoring post-test results. Post-test mean was 98.67% with standard deviation 0.75, compared to pre-test mean of 92.78% with 1.07 standard deviation. The mean difference in the assessments was 5.89%, with a standard error of 0.66. The t-test statistical analysis of these results provided a calculated t value of 4.18, which is significant because the significance level was 0.000, compared to the significance threshold of 0.05 and degrees of freedom of 5. This indicates that the experimental group's post-test benefited from the significant differences.

3.2 Presentation of the pre-test and post-test results for the control group

Table 5:It shows the results of the pre-test and post-test for the control group

Tests	Unit of measurement	Pre-tests		Post-tests		F	F *h	t. test	Sig	The indication
		mean	St.d	mean	St.d					
The handling	degree	10.50	1.04	14.16	0.74	3.66	0.42	8.69	0.000	Sig
The patting	sec	15.16	0.72	13.59	0.30	1.57	0.33	4.66	0.006	Sig
(SpO2)	%	93.10	0.53	96.96	0.82	3.86	0.52	7.39	0.001	Sig

• Significant at the 0.05 significance level with 5 degrees of freedom

Table (5) indicates that the control group exhibited statistically significant changes between the pre- and post-tests, with the post-test demonstrating a distinct advantage in the handling evaluation. The pre-test averaged 10.50 degrees with a standard deviation of 1.04, while the post-test averaged 14.16 degrees with 0.74. The mean difference between the two tests was 3.66 degrees, accompanied by a standard error of the difference of 0.42. The statistical analysis of these results using the t-test yielded a computed t-value of 8.69, which is significant, as the significance level of the test was 0.000, in contrast to the significance threshold of 0.05 and degrees of freedom of 5, which is less than 0.05. This signifies that the disparities were substantial and advantageous for the post-test of the control group.

For the control group, there are statistically significant changes between the pre- and post-tests of the tapping test, with the post-test showing good outcomes. There was a significant difference between the pre- and post-test scores; the former was 15.16 seconds (SD=0.72), while the latter was 13.59 seconds (SD=0.30). With a margin of error of 0.33 seconds, the two tests had an average difference of 1.57 seconds. Using a significance level of 0.005 (below the 0.05 threshold) and degrees of freedom of 5 (below the 0.05 threshold), the t-test-based statistical analysis yielded a computed t-value of 4.66, indicating statistical significance. This demonstrates that the differences were substantial and helped the control group on the post-test.

The control group's SpO2 pre-test and post-test differ statistically, with the post-test showing improvement. The pre-test mean was 93.10% with a standard deviation of 1.04; the post-test mean was 96.96% with 0.82. The average difference between the tests was 3.86%, with a standard error of 0.52. The statistical analysis using the t-test yielded a significant t value of 7.39, given the significance level of 0.001 and degrees of freedom of 5. In the control group, the variances were large and helped the post-test.

3.3 Presentation of post-test results for the experimental and control groups

Table 6: It shows the results of the post-tests for the experimental and control groups

Tests	Unit of measurement	Pre-tests		Post-tests		t. test	Sig	The indication
		mean	St.d	mean	St.d			
The handling	degree	15.83	0.75	14.16	0.74	3.83	0.003	Sig
The patting	sec	11.76	0.55	13.59	0.30	7.04	0.000	Sig
(SpO2)	%	98.67	0.75	96.96	0.82	3.73	0.004	Sig

• Significant at the 0.05 level with 10 degrees of freedom.

Statistical analysis of post-test findings shows that the experimental group performed better on the handling test than the control group (Table 6). Mean post-test scores were 15.83 for the experimental group and 14.16 for the control group, with a standard deviation of 0.75 and 0.74, respectively. With 10 degrees of freedom, which is less than the 0.05 significance threshold, the t-test-based statistical analysis produced a computed t-value of 3.83, indicating significance at the 0.003 level. For the experimental group's post-test, this means the discrepancies were large and beneficial.

The tapping test showed statistically significant differences between the experimental and control groups' pre-test and post-test outcomes, favoring the experimental group. The experimental group averaged 11.76 seconds with a standard deviation of 0.55, while the control group averaged 13.59 seconds with 0.30. Since the significance level of the t-test was 0.000 and the degrees of freedom of 10 were below 0.05, the estimated t-value of 7.04 was significant. This shows that the discrepancies were considerable and helped the experimental group post-test.

The experimental group's post-test (mean score 98.67% with a standard deviation of 0.75), in contrast to the control group's mean score (96.96%) with a standard deviation of 0.82, shows statistically significant differences between the pre- and post-tests of the (SpO2) test. With 10 degrees of freedom, which is less than the significance threshold of 0.05, and a significance level of 0.004, the t-test produced a significant t-value of 3.73 in the statistical analysis. This means that the differences were significant and helped the experimental group on their post-test.

3.4 Discussion of the results

The outcomes in Table (6) demonstrate statistically significant differences between the experimental and control groups in the post-tests of passing and dribbling skills, as well as in the blood oxygen saturation variable (SpO2), favoring the experimental group. This reflects the positive impact of the competitive performance-like exercises prepared by the researcher. This development was not random; it was a direct result of the nature of the exercises designed to simulate real match conditions in terms of defensive pressure, tight spaces, and the speed of transitioning between offensive and defensive duties, in addition to time constraints and decision-making under relative physical fatigue. This made the player perform the skill in its realistic context rather than in an isolated framework.

The improvement in the passing skill of the experimental group can be explained by the principle of specificity in training, as neuromuscular adaptations are more effective when the training resembles the actual performance requirements in competition. This was confirmed by Tudor Bompa, who stated, "The transfer of training effects to competition depends on the degree of similarity between them." When a player trains in mini-game situations that require continuous movement, quick reading of defenders, and precise passing under pressure, they develop not only the motor aspect of the skill but also the speed of cognitive processing and decision-making" (Bompa and Buzzichelli 2019), which ultimately reflects on the accuracy and consistency of performance. Additionally, working in a real competitive environment enhances the connection between perception and execution, which Vladimir Issurin refers to when discussing the specific qualitative adaptations of the activity, "as he confirms that performance under conditions similar to competition leads to the development of more specialized neural coordination patterns" (Issurin 2008.(

As for the skill of dribbling, the significant decrease in performance time among the experimental group indicates an improvement in ball control speed and movement fluidity. This can be explained by the fact that exercises similar to competitive performance forced the player to integrate dribbling with changing game situations that required direction changes, avoiding defenders, and making quick decisions to pass or penetrate, all within a limited time frame. This type of training reduces motor hesitation and enhances effort economy, as the player learns to execute the skill under conditions similar to what they will actually face in the match, rather than in a fixed and predictable training path. David Joyce pointed out that "training based on realistic game situations develops the ability to perform skills under physical and psychological pressure, and improves execution quality under fatigue conditions, which aligns with the nature of handball matches characterized by fast pace and continuous changes in effort intensity" (Joyce and Lewindon 2014).

Regarding the variable of blood oxygen saturation (SpO2), the improvement observed in the experimental group reflects positive physiological adaptations resulting from the intermittent nature and moderate to high intensity of exercises similar to competitive performance. Handball matches, by their nature, rely on relatively short work periods interspersed with incomplete rest periods, which keeps the cardiovascular and respiratory systems in a state of continuous response. And when the player is trained within this competitive motor pattern, it

leads to improved efficiency in oxygen transport and utilization in the working muscles. Martin Buchheit explained that "exercises similar to competition and small-sided games contribute to the development of cardiorespiratory responses due to the simultaneous integration of physical load and skill requirements" (Buchheit and Laursen 2013), which enhances the efficiency of the functional systems responsible for oxygen supply. Wilmore and Costill confirm in the physiology of training that "regular exposure to appropriate training loads leads to improved functional efficiency of the cardiovascular and respiratory systems and increased effectiveness of oxygen utilization within muscle tissues" (Wilmore and Costill 2012).

The researcher believes that the true value of the training program lies in its integration of skill development and physiological development within a single competitive context, which led to comprehensive adaptations that were clearly reflected in the statistical results. The player did not train on passing or dribbling as isolated mechanical skills, but rather practiced them in an environment that simulates the reality of the match, which enhanced the transfer of training effects to actual performance. Accordingly, the significant differences that appeared in favor of the experimental group confirm the effectiveness of exercises similar to competitive performance in developing the skill and physiological aspects of handball junior players, and support the modern approach in sports training that focuses on simulating competition requirements as the optimal framework for achieving comprehensive qualitative adaptation.

4. Conclusions and Recommendations

4.1 Conclusions

- As the empirical evidence suggests, exercise protocols that were similar to a competitive performance were effective in helping the development of passing skills in the junior players of handball game since the accuracy of passing and the velocity of passing showed statistically significant improvement compared to the control group. The empirical results show that exercise regimes similar to the competitions performance were prolific in the acquisition of passing skills among the junior handball players; because the accuracy and velocity of the passing execution showed statistically significant difference relative to the control group.
- These exercises also contributed to the development of dribbling skills, as players in the experimental group showed a significant reduction in dribbling time, reflecting improved ball control and faster motor response under defensive and time pressure. These exercises also contributed to the development of the dribbling skill, as the players in the experimental group showed a significant reduction in dribbling time, reflecting an improvement in ball control and the speed of motor response under defensive and time pressure .
- The results showed a significant improvement in the physiological variable (SpO2) among the experimental players, indicating enhanced efficiency of the cardiovascular and respiratory systems due to the nature of the high-intensity interval training similar to competitive performance. The results showed a significant improvement in the

physiological variable (SpO2) among the experimental players, indicating an enhancement in the efficiency of the circulatory and respiratory systems due to the nature of the high-intensity intermittent exercises similar to competitive performance.

- The results reveal that integrating skill training with an environment that simulates the actual match enhances the integration between skill and physiological aspects, and increases the effectiveness of qualitative adaptations in novice players compared to traditional isolated skill training. The results reveal that integrating skill training with an environment that simulates the actual match enhances the integration between skill and physiological aspects, and increases the effectiveness of qualitative adaptations in young players compared to traditional isolated skill training.
- The study emphasizes the importance of designing training programs that simulate competitive performance, taking into account intensity, performance duration, and recovery periods, to ensure comprehensive and sustainable development in both technical performance and physiological capacity. The study emphasizes the importance of designing training programs that simulate competitive performance, taking into account intensity, performance time, and recovery periods, to ensure comprehensive and sustainable development in both technical performance and physiological capacity.

4.2 Recommendations

- Include exercises similar to competitive performance in youth handball training programs, focusing on simulating actual game situations to achieve simultaneous skill and physiological development. Incorporating exercises similar to competitive performance within youth handball training programs, with a focus on simulating actual game situations to achieve simultaneous skill and physiological development.
- Applying a gradual increase in intensity and duration of exercises during training weeks, achieving a balance between physical load and recovery periods, and enhancing positive adaptations. Applying a gradual increase in intensity and duration of exercises during the training weeks, achieving a balance between physical load and recovery periods, and enhancing positive adaptations .
- Repeated use of small-sided games to enhance decision-making speed and improve ball control, with adjustments to the spaces and number of players according to the age group's level. Repeated use of small-sided games to enhance decision-making speed and improve ball control, with adjustments to the spaces and number of players according to the age group's level .
- Monitoring physiological variables, such as blood oxygen saturation (SpO2), during high-intensity exercises to assess physical response and ensure player safety. Monitoring physiological variables, such as blood oxygen saturation (SpO2), during high-intensity exercises to assess physical response and ensure player safety.
- Conduct similar research on other samples. Conducting similar research on other samples.

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