Proximus Journal of Sports Science and Physical Education
Volume 1, Issue 4, April, 2024
https://proximusjournal.com/index.php/PJSSPE
ISSN (E): 2942-9943

THE EFFECT OF A TRAINING PROGRAM FOR SOME COMPONENTS OF MUSCLE STRENGTH ON THE LEVEL OF TECHNICAL PERFORMANCE OF THE SKILL OF HALF A FRONT LAP OF THE HANDSTAND ON THE PARALLEL DEVICE FOR JUNIORS

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Abstract
The objective of the research was to investigate the muscular strength, specifically explosive power and speed strength, and its influence on the skill performance of the half lap handstand on the parallel device for men. This was achieved by designing a training program that targeted muscle strength development based on the specific movement patterns involved in the skill. The research community comprised the Misan Junior Gymnastics Team, consisting of six players, who participated in the finals organized by the Central Federation of Gymnastics. The researcher employed the experimental approach to address the research topic. The research sample had two groups: an experimental group and a control group, with each group consisting of three participants. The researcher employed suitable assessments to quantify the players' muscular strength. These assessments included arm flexion and extension on a parallel device for male participants, torso flexion and extension from a supine position with bent legs, throwing a 2 kg medicine ball while seated, and a skill test involving standing on hands for half a lap. The researcher conducted two exploratory experiments: one focused on the tests used and the other on the prepared training curriculum. The pre-tests were administered on October 17-18, 2023. The training program consisted of three units per week and started on October 20, 2023, lasting until December 21, 2023. This program spanned 8 weeks and included a total of 24 daily training units. Following the completion of the program, the researcher administered post-tests to the research sample on December 23-24, 2023. Following data collection, the researcher utilized the statistical software SPSS to extract the conclusive findings of the study using suitable statistical methods. Subsequently, the researcher presented and analyzed the outcomes of the variables before and after the research .The researcher determined that incorporating muscular strength exercises, namely those targeting explosive power and speed strength, into the training program benefitted all participants in the research sample. The strength of the arms and torso significantly affects the development of skill performance in the half-roll handstand on the parallel bars for males. The force generated by the arms significantly influences the proficiency of executing the half-lap technique in the handstand on the parallel bars for male athletes. Summary The researcher provided the following suggestions: Implement the training curriculum activities across different age groups and skill sets. Emphasize the velocity and robustness of the arms and legs when honing other abilities on the men's parallel bars and similar apparatus. Concentrate on harnessing the forceful strength of the arms to enhance proficiency in various skills on the parallel apparatus and other similar devices.

Keywords: Training Program, Muscle Strength, Technical Performance, Front Lap, Handstand, Parallel Device.

Introduction

Sports have undergone significant advancements in terms of performance and the rules of play (Camomilla et al., 2018). Gymnastics, in particular, has made notable progress by incorporating principles from various

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https://proximusjournal.com/index.php/PJSSPE
ISSN (E): 2942-9943

scientific disciplines (Farana et al., 2023). This integration has played a crucial role in enhancing skill levels and addressing motor challenges (Paillard, 2019). The sport of gymnastics has undergone significant evolution, as evidenced by the emergence of motor difficulties (A-G) as the most challenging elements (Hernández-Beltrán et a;., 2023). This progress did not occur spontaneously, but rather through continuous reflection on the development of training levels and methods, particularly in the early stages of player preparation (Woods et al., 2021). The training curriculum for gymnastics places great emphasis on physical preparation during the junior training phase, particularly in terms of muscular strength (Nassib et al., 2020). Therefore, the researcher aimed to focus on specific components of muscular strength, particularly strength. It is distinguished by its velocity and forceful strength, and serves as a crucial foundation for enhancing the performance level of the skill being examined. The significance of the research lies in its contribution to the enhancement of muscle strength required for performing the talent of a half lap handstand on a parallel device. Additionally, it aims to improve the technical execution and increase the level of difficulty of the skill.

Search Problem

Through the researcher's observation of the technical performance of the half lap to stand skill on the parallel device for junior members of the Misan team, it was noticed that the players were unable to successfully execute the skill due to weakness in their balance after completing the lap. Additionally, they struggled to achieve a sufficient amount of airtime during the skill, which is necessary to bring them to a standing position or close to it. This lack of explosive power in the arms and trunk, which is crucial for achieving a high flight, was identified as the main cause. Consequently, the researcher aimed to develop a training curriculum that focuses on enhancing specific components of muscular strength, particularly the speed and explosive power of the arms, in order to effectively improve the technical performance of this skill.

Research Objectives

1. Preparing a training curriculum for some components of muscular strength for young players for explosive power and speed strength.
2. Developing the skill of half a roll to stand on the hands on the parallel device for men.

Research Hypotheses:

1. The training curriculum affects some components of muscle strength that contribute to the level of technical performance of the half-lap skill for handstands for juniors on the parallel device.
2. Some components of muscular strength have an impact on the level of technical performance of the half-roll skill of handstand on the parallel device.

Research Areas:

Human area: Misan Youth Center Gymnastics Players.
Spatial area: The training centre in Misan Governorate.
Temporal area: the period from 15/9/2023 - 24/12/2023.

Methodology

Research Methodology and Field Procedures:

Research Methodology:

The researcher employed the experimental methodology to address the problem, utilizing both experimental and control groups. The strategy serves as the pathway towards the intended objective, acting as an imperceptible thread that guides the research from inception to conclusion, ultimately yielding certain outcomes (Jonker & Pennink, 2010).

Research population and sample:

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The research community comprised six players from the Misan junior squad. The researcher picked all members of the community due to their small number. The players were randomly divided into two groups, with each group consisting of three players.

Table 1: Shows the equivalence of the control and experimental groups of the research variables through the value of the arithmetic mean, standard deviation, calculated and tabular value (T), level of significance and significant differences.

Variables	Unit of Measurement	Control		Experimental		T	Sig
		M	SD	M	SD		
Bending and extending the arms of attachment to the mind (15/Snd)	Second	10.89	0.862	10.75	1.45	2.77	0.005
Reclining position on the back Lift and lower the torso (15/Snd)	Second	6.34	1.87	6.21	1.53		
Throwing the medicine ball from a sitting position on the seat	Degree	242	9.45	240	10.11		
Skill Test	Degree	3.14	0.678	3.20	0.960		

Means of collecting information, devices and tools used in research:

Means of collecting information:

- Arab and foreign sources.
- International information network Internet.
- Observation, experimentation, tests and measurement.
- Software and applications in the computer.

Devices and tools used in research:

- Parallel device for legal men.
- Auxiliary ground parallel.
- Two wooden boxes.
- Sports ladders (2).
- Extend the safety and security of (8) with a height of (20) cm.
- Stopwatches (2) Sewan type.
- Bra weighting number (2).
- Weighting kitrates for the two men, number (3) pair.
- Weight citrates for the arms number (2) The weight of both types of cutters is subject to change.
- Medical balls (2 kg) number (3).

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- Rubber cords for arms.
- Rubber ropes for legs.
- Auxiliary throat device.
- Floor mat movements.
- Electronic calculator number (1) KenKo type.
- One (1) Dell laptop.
- One (1) Canon printer.

Tests used of the study

First: Test of the velocity strength of the muscles of the arms:

Test name: Test of bending and extending arms in parallel (Sreckovic et al., 2015).

The objective of the test: to measure the maximum dynamic muscular strength of the arms and shoulders during the upward push-up movement, especially the muscles of the arms within 30 seconds.

Tools used: A parallel device at a height level slightly higher than the height of the shoulders and is chest wide for any laboratory that allows it to bend and stretch without its feet touching the ground and a wooden bench.

Test Procedures: At the signal, the tester begins by bending the arms down until the elbows are at a right angle and extending the arms to reach the initial position.

Degree calculation:

1. One kit is calculated for each correct and complete payment .
2. The test ends and the count stops where the time reaches 30 seconds, two attempts are given and the best attempt is counted.

Second: **Test the strength characteristic of the speed of the abdominal muscles:**

Test name: Sitting test from lying down from a knee-bent position (15/s) (Wu et al., 2024) .

Test objective: Measure the strength characteristic by the speed of the abdominal muscles.

How to perform: The laboratory takes a lying position on the back and then bends the knees and the laboratory interlaces the fingers of the hands behind the neck and one of the testers installs the heels of the laboratory during the performance of the test. When the tester is given the start signal, he sits down so that the player's chest touches his knees, and the tester continues to repeat the previous performance as many times as possible until the time expires. The laboratory is given only one attempt .

Calculation of grades: The degree of the laboratory is the number of sittings from the correct lying recorded by him. The number of sittings from lying down is not counted correctly in the following cases :

1. Unscrew the fingers behind the neck.
2. Do not touch the knees.
3. When pushing the ground with the elbow while sitting

Third: Test the explosive power of the muscles of the arms :

Test name: Test throwing a medical ball weighing (2 kg) over the head with hands. (Raeder, Fernandez-Fernandez & Ferrauti, 2015) .

Test objective: Measure the explosive power of the arms and shoulders.

Test conditions: The tester is given an independent attempt at the beginning of the test as a performance exercise, the tester is given two consecutive attempts, when the tester shakes or moves during the throw, the result is not counted and another attempt is given instead.

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Calculation of the score: The score of each attempt is the distance between the front edge of the chair and the closest point that the ball places on the ground, and the degree of the tester is the score of the best attempt of the two attempts.

Fourth: Skill Test

Test Name: Men's Half-Roll Handstand Skill Test (Handayani et al., 2023).

Test objective: To find out the degree of special requirements and the final score that the player obtains from performing the movement chain on the men's parallel device and measure the player's ability to perform the half-lap skill of handstand on the parallel device.

Testing procedures: The tester takes the position of the fulcrum on the parallel device for men, then the player performs the weighting, and when performing the front weighting, and at the front dead point, he pushes the bar with both hands, with the legs and hips directed upwards, keeping the legs outstretched, and when the legs reach the highest possible, the player twists the body (half a lap of 180°).

When the body is twisted, the player moves the arms to the opposite direction to reach a handstand and anchor position with stability for (3) seconds.

Registration: The evaluation is done by four referees and according to the International Law of Gymnastics, where one of these referees is the chairman of the committee and is given (4 degrees) the chairman of the committee deletes the highest degree and the lowest degree and takes the average of the two degrees and divides by (2) for the purpose of extracting the player's final degree and the performance evaluation is of (10) degrees and according to the following law, (skill test score = the sum of the two intermediate grades / 2).

Field Research Procedures:

Exploratory experiments:

First exploratory experiment:

The researcher conducted an initial exploratory experiment on a group of players from the research sample on 2/10/2023 at 3:00 PM. The purpose of this experiment was to ensure the validity of the tests, the timing, the assistance provided by the staff, and the overall efficiency of the testing process. Based on this experience, the researcher concluded that the timing was appropriate, the tests were valid and well-understood by the players, and the staff was efficient and sufficient. As a result, the researcher decided to divide the skills assessment into two days, with one day dedicated to physical tests and the second day focused on skill tests.

Second exploratory experiment:

The researcher carried out a second exploratory experiment on 6-7/10/2023 at 3 pm. The purpose of this experiment was to assess the effectiveness and understanding of the training program units by a group of players. Additionally, the researcher aimed to validate the exercises, as well as the devices and tools used in the experiment.

Pre-tests:

The researcher administered pre-tests to both the experimental and control research samples on October 17-18, 2023, at 3:00 PM, with the aim of obtaining preliminary results for the study sample.

Main experience:

The exercises of the training program were prepared depending on the type of strength working in the skill, in the light of which the researcher formulated the muscular strength exercises of the skill and clarification of the contents of the training program, they are graded as follows :

1. The first training unit was conducted on 20/10/2023 immediately after the pre-tests and the last training unit on 21/3/2023.
2. The researcher prepared the exercises for special muscle strength according to the motor path required by the skill performance.

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3. The total time of the training unit of the trainer is (120 / minute) for the training unit, i.e. (2 hours).
4. The implementation time of the training program took (8 weeks) and an average of (3 / units) training per week are (Sunday, Tuesday and Thursday). The time of each training unit ranges between (20-30 / minute) for muscle strength training.
5. Taking into account the individual differences between the players in terms of age, training age, and physical and motor abilities . As for the time used by the researcher in the main section of the trainer's curriculum, which was (20-30 / minute), it was in the period of special preparation, and the muscular strength exercises in the training curriculum for the arms and torso were similar in their paths to the motor paths of the skill that is under study.
6. The total time is distributed consistently between the strength exercises characterized by speed and explosive power .
7. The researcher was given muscle strength exercises at the beginning of the middle of the main section of the training unit, and sometimes part of the time of the closing section is taken to be used to give exercises. The researcher was only responsible for their training program (20-30/minute) only and not responsible for the trainer's curriculum.
8. The researcher used the method of interval training high intensity and frequency to fit it with the stage of special preparation and the researchers graded the intensity of the training, which was (2-1). Any two units with high intensity and a training unit with medium intensity, in order to suit this age group, taking into account the number of repetitions, the duration of rest and the duration of the exciting between one repetition and another, and the rest periods for the players range between (60-90) seconds between repetitions to restore recovery in the members of the experimental group and maintain the player's non-access to overload, by rationing the rest periods between one exercise and another.
9. The researcher developed their training program according to the general curriculum of the coach by entering the special preparation period has been strongly started (75%) in the first week of three training units and ascending to (95%), taking into account the gradation of the training program from easy to difficult and not to reach the player to the stage of overload. The daily training unit began with speed strength exercises followed by explosive power. The researcher put the repetitions of special muscle strength exercises according to the player's ability to perform the maximum exercise and the researchers relied on the number of repetitions.
10. To train explosive power, the researcher has relied on the method of weighting through sources and references in sports training and gymnastics.
11. Which stipulates the use of a maximum of one third of the player's weight in this age group in the case of using body weight in exercises, but if the exercises are without body weight, the weight can be equivalent to (50%) of the body weight as a maximum. In light of it, the researcher distributed the weights to suit the exercises for his training program according to the following law: (weight used in the exercise = maximum weight × required intensity / 100).
12. With regard to the repetitions that suit the strength, the researchers identified them according to sources and references, and when they increased the training intensity, the training intensity was raised by increasing the weight of the player and reducing the repetitions or stabilizing the weight and increasing the repetitions.
13. In the muscular strength exercises, the researcher used different forms of exercises with or without body weight, with tools and devices, and using weights to achieve the goal for which the program was developed.

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14. To accurately calculate the intensity of the training program, the researchers used the law of calculating the partial intensity of the force extension. (Total intensity = total intensity of exercise in the training unit / number of exercises).

Physical and skill post-tests:

The post-tests of the research sample, which included physical and skill-based assessments, took place at three o'clock in the afternoon on Sunday and Monday, December 23-24, 2023. The tests were conducted at the Central Union Hall / Misan Branch of the Directorate of Sports and Youth in Misan Governorate. The researcher ensured that similar conditions were provided as in the previous experiment, including the arrangement of tests, the preparation of the same assistant staff and referees, and the use of identical tools and devices.

Statistical means:

The researcher used the statistical bag (SPSS-24) to obtain the final statistical results of the research variables:

- Arithmetic mean.
- Standard deviation.
- T test for symmetrical samples.

Presentation, analysis and discussion of results:

Presentation and analysis of results:

Presentation and analysis of the results of pre-posttests of the research variables of the control groups:

Table 2: Shows the arithmetic mean, standard deviation, and calculated and tabular values (t) for tests pre- and post-research variables for the control group.

Variables	Unit of Measurement	Pre-Test		Post-Test		T	Sig
		M	SD	M	SD		
Bending and extending the arms of attachment to the mind (15/Snd)	Second	11.09	0.577	13.23	1.01	4.38	0.002
Reclining position on the back Lift and lower the torso (15/Snd)	Second	6.56	1.44	8.66	1.29	5.89	0.003
Throwing the medicine ball from a sitting position on the seat	Degree	253	8.18	277	8.50	4.49	0.001
Skill Test	Degree	3.36	0.678	5.67	0.530	7.33	0.002

*df (2) and level of significance (0.005)

Through Table (2)we note that the arithmetic mean and standard deviation of the control group in the pre-test of the strength characteristic of speed of the arms and shoulders have reached (11.09- 0.577) and in the post-test they were (13.23-1.01), the calculated value of (t) was (5.00) and when compared to the tabular value of (t) of (4,38) under the degree of freedom (2) and the level of significance (0.05), we find that the differences were significant for the control group between the pre- and post-test. Upon revisiting Table (2), we observe that the average and variability of the control group's trunk velocity strength were (6.56 - 1.44) in the pre-test and (8.66 - 1.29) in the post-test. The calculated value of (t) was (2.00) and when compared with the tabular value of (t) of (5.89) under the degree of freedom (2) and the threshold of significance (0.05), we conclude that there is no significant difference between the control group's pre- and post-test results. Upon revisiting

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Table (2) to assess the explosive strength of the arms, we observe that the control group's average and variability in the pre-test were (253 - 8.18) and in the post-test, they were (277 - 8,50). The calculated value of (t) was (4.49) and when compared with the tabular value of (t) of (4,303) under the degree of freedom (2) and the level of significance (0.05), we conclude that there is no significant difference for the control group between the pre- and post-test. Upon examining Table (2) for the skill test, it is evident that the control group's arithmetic mean and standard deviation were (3.36 - 0.530) in the pre-test and (5.67 - 0.678) in the post-test. The calculated value of (t) was (7.33) and when compared with the tabular value of (t) of (4,303) under the degree of freedom (2) and the level of significance (0.05), it is evident that there are significant differences for the control group between the pre- and post-test.

Presentation and analysis of the results of pre-post tests of the research variables of the two experimental group

Table 3: Shows the arithmetic mean, standard deviation, and calculated and tabular values (t) for tests pre- and post-research variables for the experimental group.

Variables	Unit of Measurement	Pre-Test		Post-Test		T	Sig
		M	SD	M	SD		
Bending and extending the arms of attachment to the mind (15/Snd)	Second	11.33	1.13	15.66	1.35	9.75	0.000
Reclining position on the back Lift and lower the torso (15/Snd)	Second	6.44	1.22	9.67	1.31	8.24	0.000
Throwing the medicine ball from a sitting position on the seat	Degree	260	8.99	311	9.53	6.65	0.000
Skill Test	Degree	3.46	0.832	8.23	1.05	5.82	0.000

*df (2) and level of significance (0.005)

Through Table (2) in the pre-test, the experimental group had a mean of 1(11.33) and a standard deviation of (1.13). In the post-test, the mean was (15.66) and the standard deviation was (1.35). The computed value of (t) was (9.75) and upon comparison with the critical value (t) of (4.303) at a significance level of (0.05) and degrees of freedom (2), it is evident that there were significant differences seen in the experimental group between the pre-test and post-test. The experimental group's arithmetic mean and standard deviation were calculated for both the pre-test (6.44) and the post-test (9.67). The computed value of (t) was (8.24) and upon comparison with the tabulated value (t) of (4,303) at a degree of freedom (2) and a significance level of (0.05), it is evident that there are significant differences between the pre-test and post-test for the experimental group. In the pre-test, the experimental group had an arithmetic mean of (260) with a standard deviation (8.99). In the post-test, the arithmetic mean was (311) with a standard deviation of (9.53). The calculated value of (t) was (6.65). When compared with the tabular value (t) of (4,303) under the degree of freedom (2) and the level of significance (0.05), we observe that there is a significant difference for the experimental group between the pre-post-test. The arithmetic mean and standard deviation of the experimental group in the pre-test were (3.46 - 0.832) and in the post-test were (8.23 - 1.05). The calculated value of (t) was (5.82) and when compared with

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the tabular value (t) of (4,303) under the degree of freedom (2) and the level of significance (0.05), we observe that there is a significant difference for the experimental group between the pre-post test.

Presentation and analysis of the results of the post-tests of the research variables of the experimental and control groups:

Table 4: Shows the arithmetic mean, standard deviation, and calculated and tabular values (t) for post- test research variables for the experimental and control groups.

Variables	Unit of Measurement	Control		Experimental		T	Sig
		M	SD	M	SD		
Bending and extending the arms of attachment to the mind (15/Snd)	Second	13.23	1.01	15.66	1.35	8.37	0.000
Reclining position on the back Lift and lower the torso (15/Snd)	Second	8.66	1.29	9.67	1.31	7.90	0.000
Throwing the medicine ball from a sitting position on the seat	Degree	277	8.50	311	9.53	5.48	0.000
Skill Test	Degree	5.67	0.530	8.23	1.05	6.78	0.000

* df (4) and the level of significance (0,05).

Upon examining Table (3) regarding the velocity-characteristic force test of the arms and shoulders, we observe that the average and variability of the control group in the post-test were recorded as (13.23-1.01). The experimental group had a mean value of (15.66 - 1.35). The calculated value of t was 4.00. When compared with the tabular value of t (8.38) at a significance level of 0.05 and with 4 degrees of freedom, we found that the differences were statistically significant and favored the experimental group in the post-tests. Referring to Table (3) and examining the velocity-characteristic force test results of trunk, it becomes evident that the arithmetic mean and standard deviation of the control group in the post-test were (8.66 - 1.29). The experimental group achieved a mean value of (9.67 - 1.31) and a calculated t-value of (7.90). When compared to the tabulated t-value (2,776) at a significance level of 0.05 and with 4 degrees of freedom, the differences were found to be statistically significant, favoring the experimental group in the post-tests. Upon revisiting Table (3) and examining test No. (3), specifically the explosive power test of the arms, it is evident that the control group's arithmetic mean and standard deviation in the post-test have reached (277 - 8,50). The experimental group achieved a range of (311-9.53) and a calculated value of (t) of (5.48). When compared to the tabular value of (t) for adults (2,77) with a degree of freedom of (4) and a significance level of (0.05), we observe that the differences are statistically significant and favor the experimental group in the post-tests. Referring to Table (2), the post-test arithmetic mean and standard deviation of the control group were calculated to be (5.67 - 0.678). The experimental group achieved a mean value of (8.23 - 1.05), with a calculated t-value of (6.78). When compared to the tabular t-value of (2.77) at a significance level of 0.05 and with 4 degrees of freedom, the differences were found to be statistically significant in favor of the experimental group in the post-tests

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Discussion of the results of the research variables :

Upon analyzing Table (2) for physical tests, it is evident that there is a significant difference between the pre- and post-tests for each test conducted on the experimental group. These tests utilized a training program developed by the researcher. The researcher attributes the success of the program to the accurate design of the training program and the specific exercises used. These factors effectively contributed to the improvement of special strength elements, specifically the speed and explosive power of the arms and shoulders, as well as the speed of the abdominal muscles. These improvements greatly enhance the ability to perform the skill of half a lap of handstands on a parallel device. To ensure the successful attainment of sports training goals, the coach must meticulously organize and plan the training process (Kılıç, 2019). This planning involves implementing precise and systematic scientific procedures that enable athletes to achieve exceptional performance outcomes (Aviles, Dıaz & Borras, 2015). Upon examining Table (3) for physical testing, it becomes evident that the post-test results for each of the tests show significant and favorable differences in favor of the experimental group (Abassi et al., 2023; Cocca et al., 2020;Stamatis et al., 2020). The researcher credits this phenomenon to the efficacy of the specific physical strength exercises incorporated into the training program. These exercises were carefully designed to closely mimic the motor pathways involved in the skill, hence enhancing performance. When establishing guidelines for gymnastics muscle training, it is advisable to prescribe a limited number of repetitions within a brief duration for each activity. Typically, weightlifting tires are used in combination with varying repetitions based on the specific training type. This approach is often beneficial for most athletes (Garhammer, 2020; Sanjar, 2022). Experts widely concur on the necessity of consistently integrating physical training with technical training (Appelbaum & Erickson, 2018; Bradley & Ade, 2018; Mujika et al., 2018). This is because effective technical training involves utilizing physical abilities efficiently and optimally. General physical training focuses on developing fundamental physical qualities in a comprehensive and well-rounded manner, while special physical training aims to enhance the specific physical qualities required for the athlete's chosen sport. The goal is to continuously improve these qualities to their maximum potential, enabling athletes to reach the highest level of performance (Dolci et al., 2020; Ribeiro et al., 2021).

Conclusions:

Based on the researcher's field experiment and their utilization of suitable statistical methods for analyzing the results, the following conclusions were reached :

1. The inclusion of activities that focus on muscular strength (specifically explosive power and speed strength) in the training program for all participants in the research sample.
2. The speed at which the arms and trunk can move is crucial for the development of skill performance in the half-roll skill to stand on the hands on the parallel device for men.
3. The arms' explosive force significantly influences the skill performance of the half roll to stand on the hands on the parallel device for males.

Recommendations:

Based on the researcher's findings, he suggests the following:

1. Implementing the training curriculum activities for different age groups and diverse skill sets.
2. The primary focus is on enhancing the speed-related strength of the arms and legs, which in turn aids in the development of various skills on the parallel device for men and other similar devices.
3. Concentrate on harnessing the forceful strength of the arms to enhance proficiency in various skills on the parallel device and other apparatus.

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Proximus Journal of Sports Science and Physical Education
Volume 1, Issue 4, April, 2024
https://proximusjournal.com/index.php/PJSSPE
ISSN (E): 2942-9943

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