

The Effect of Training Using Auxiliary Devices to Develop Some Physical Abilities and the Skill of Standing on Hands Using a Parallel Apparatus

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Abstract:

At present, the pace of scientific progress is causing peripheral revolutions in the lives of people through executing planning techniques directed towards achieving various human objectives. This advancement encompasses every area including sports. The level of performance progress in artistic gymnastics is also impressive, particularly in disciplines of the parallel bars. There are multiple demands to movement on this apparatus: strength for a broad range, controlled swings and handstands and landings must all be accurate and precise. In order to perform these skills prospective athletes should exhibit high levels of strength, speed, endurance, agility, balance and flexibility.

More than once during the researcher's experience in watching national gymnastics competitors and during their training programs such concerns were noticed – parallel bars are the most cut off areas when a player is performing. The significant loss in performance led to lags in accuracy and stability score lines. This research endeavored to develop specific auxiliary tools which would combine appropriately with physical exercise for enhancement of refined abilities and skills on the parallel bars. Due to the above, the research hypothesis was upheld; it assumed that the post-test results of the experimental group will have better achievements than the control group in the pre and post-tests of physical abilities relevant to the parallel bar skills.

After ensuring homogeneity and equivalency of the experimental groups the researcher trained individuals in the experimental group for the period of 24 sessions involving specialized training exercises. Using the experimental group, the findings showed that the assistive tools exercises improved the physiques and skills of the members of the experimental group. Furthermore, the use

of assistive tools showed that there was a reduction in the time and effort made by the coaches and the athletes themselves in developing performance on specific skills.

1- Introduction

1-1 importance of the research:

Sports training plays a role in creating the right training programs for each game or sporting event, by applying its principles, regulations and scientific basis. The sport of gymnastics is unique among all games in that it requires special physical abilities and high standards of technical performance. Furthermore, the athletes practicing it are relatively young as compared to other sports' competitors.

Since several factors such as shaping and developing of one's body, attaining a great physique and high level of physical fitness contribute to success in this game that is individualistic in nature; this creates room for creativity in making new moves hence offering unlimited opportunities for learning how to venture into new things so that there are possibilities of being successful whenever they perform various movements which enable creating consistency, continuity and harmony between players.

Many people have loved parallel bars because their particularities, pluses and elaborate changeability within the techniques done. Therefore, on this device movement nature implies strength, stability diversity of movements combined with swings, strength stability pronation movement sequences ending with landing. This is why research has to be done on designing exercise using instructional aids that will help develop motor skills.

1-2 Research problem:

The problem that treasures athletes in gymnastics the most is the recurrent score deductions done by the judging panel. The scholar learned through his firsthand observation of certain national level gymnastics competition events and training that there was a persistent problem: players repeatedly show a relatively low effectiveness in both parallel bars' physical and technical skills, thus suffering from these losses. Some athletes feel difficulties in performing these high-end motor skills with the desired complexity of elements which ruins the overall outcome of their performance. As some of the coaches put it, this performance handicap is a result of poor physical preparation that does not provision the target needs of the skill in question. In terms of cardiovascular workout, gymnastics training is normally performed in an improvisational manner on the basis of thorough self-evaluation with hardly any supplementary, training devices or instruments, owing to the fact that they do not exist for the time being. The existing predicament compelled the researcher to use auxiliary training implements as well as create appropriate exercises designed to enhance the physical attributes and technical mastery of the performers so as to achieve better results on the parallels.

1-3 Research objectives:

- 1- Preparing exercises using auxiliary methods and tools to develop some physical and skill abilities on the parallel machine.
- 2- Identify the effect of training using aids and tools to develop some physical abilities and special skills on the parallel machine.

1-4 Research hypotheses :

- 1- Both the experimental and control groups' pre- and post-test results on physical abilities and particular skills on the parallel bars differ significantly, with the post-test findings showing a preference for the latter.

- 2- The experimental and control groups' post-test findings show notable variations in their physical prowess and particular skills on the parallel bars, with the experimental group outperforming the control group.

1-5 Research areas:

1-5-1 Human field: Junior gymnasts, aged 10-12 years, training center in Dhi Qar Governorate.

1-5-3 Temporal scope: the period from 11/1/2023 to 3/1/2024

1-5-3 Spatial area: The hall of the Nasiriyah Specialized Gymnastics Training Center.

2- Research methodology and field procedures:

2-1 Research methodology:

In order to gather relevant information, the researcher used a quasi-experimental research design where there were two equivalent groups: the experimental and the control group. Pre-test and post-test designs were also present in the study as the design that would best suit the research problem.

3-2 The research community and its sample:

The model was sport players among developing gymnastics students aged between 10 and 12 years and a total sample size of 8 that was drawn from the population of 20 students from a specialized center in Nasiriyah. This sample was selected to ward off selection bias. Players were randomly allocated to experimental and control groups containing 4 players each through a lottery method.

For the sake of the uniformity of the variables, skewness coefficients were computed by the researcher. According to Table 1, all the investigated coefficients of skewness are less than 3, hence the sample followed a normal distribution.

Table (1) It shows the homogeneity of the research sample members in the sample specifications

Torsion coefficient	standard deviation	Arithmetic mean	measuring unit	Variables	T
0,32	10,43	139,37	poison	height	1
0,02	7,36	33,75	Kg	Bloc	2
0,00	9,07	132.00	Month	the age	3
0.99	10,99	52,50	Month	Training age	4

After that, the researcher conducted equivalence between the control and experimental groups, as shown in Table (2).

Table (2) shows the equality of the two groups

Indication	Sig	Control group		Experimental group		measruing unit	Variables	T
		standard deviation	Arithmetic mean	standard deviation	Arith metric mean			
Insignifica nt	0,64	12,91	141,25	8,081	137,50	Poison	height	1
Insignifica nt	0,60	6,65	32,25	8,73	35,25	Kg	Bloc	2
Insignifica	1,00	9,79	132.00	9,79	132.00	Month	the age	3

nt								
Insignific nt	0,73	12,00	54,00	11,48	51,00	Month	Training age	4
Insignific nt	0,31	1,25	6,25	1,00	6,50	Number	Power distinguishe d by speed For the arms	5
Insignific nt	0,33	2,08	18,50	2,16	19,00	Number	Power distinguishe d by speed For both legs	6
Insignific nt	0,51	1,70	15,75	0,95	16,25	Tha	Balance	7
Insignific nt	0,67	0,95	4,75	0,57	4,50	Degree	Handstand skill	7

2-3 Methods, devices and tools used in the research:

2-3-1 Methods of data collection:

1. Note.
2. Arab and foreign sources.
3. Personal interviews: The researcher conducted personal interviews with some specialists in the field of gymnastics To benefit from their opinions regarding variables in the research.
4. Questionnaire form to determine tests and expert form.
5. Tests and standards.
6. International Communications Network (Internet).
7. Performance evaluation form.

2-3-2 Devices and tools:

1. Tape to measure length.
2. medical scale (Renata) of Korean origin.
3. Video camera (Japanese-made) SONY (1) with accessories.
4. Sponge rugs of various thicknesses and sizes.
5. Parallel device number 1.
6. Casio electronic stopwatch (2)
7. Chair number 1.
8. Flash RAM (1)
9. Laptop computer (Dell) with accessories (1)

2-4 Procedures of field research:

2-4-1: Testing the strength and speed of the arms (pushing on the parallel bar)

- Test Objective: This test is intended to evaluate the speed and strength of the arms and shoulders. Useful Age and Gender: Boys ten years old to college age are suitable.

- **Required Equipment:** Each participant will have a regulation-level parallel bar equipment that is placed just above shoulder level and chest breadth, as well as sponge matting. **Guidelines for Performance:** The athlete begins by placing both hands on the parallel bars, and then, as shown in Figure 4, repeatedly bends and extends the arms as quickly as they can for 10 seconds.
- **Recording:** Points are given for each proper and full push-up, which begins with the arms bent and ends with the full extension back to the starting posture. The test is over when 10 seconds have passed, and the count stops.

2-4-2 Testing the strength and speed of the legs⁽ⁱ⁾

- **Purpose of the test:** The goal of this exam is to gauge your leg strength and speed. **Applicable Age and Gender:** Males and females between the ages of 10 and university are both eligible.
- **Equipment Needed:** Floor mat and stopwatch.
- **Performance Instructions:** As seen in Figure 5, the participant must continually execute full knee bends and extensions for 20 seconds while maintaining a conventional standing stance. No part of the body may come into contact with the floor or other surfaces.
- **Scoring:** A record is made of how many repetitions were done correctly in the allotted 20 seconds.

2-4-3 Static balance test⁽ⁱⁱ⁾

- ✓ **Purpose of the test:** This test aims to measure static balance.
- ✓ **Tools used:** horse handles, stopwatch, sponge mats.
- ✓ **Performance specifications:** The tester takes a parallel standing position - grasping the two rings of the horse's handles. With the start signal, the athlete jumps to an open base, and holds the position for the longest possible period.
- ✓ **Recording:** Calculating the stability time in seconds.

2-4-4 Description of skill tests:

The researcher conducted tests of the handstand skill on a parallel device for the members of the research sample. The tests included the members of the research sample performing the handstand skill. It was photographed and presented to the judges for evaluation by a jury composed of four judges. It was done with the agreement of the members of the jury to evaluate the technical performance. For members of the research sample, by watching the television show for the pre- and post-test of skills. The judging form includes the judges' scores, the value of each of which is (10 scores). The highest and lowest scores are crossed out, and the two intermediate scores are combined and divided by (2) to extract the player's final score.

2-5 Pretests:

On Saturday, Nov. 4, 2023, the researcher administered pre-tests to evaluate the technical proficiency and specific physical abilities of the experimental and control groups on the parallel apparatus.

2-6 Special exercises:

2-6-1 Exercise Design by Researcher

A particular set of exercises was made by the researcher to improve physical abilities and skills of players of Al-Takhassusi Center in Nasiriyah. These exercises were designed according to the goals of special preparation phase which involved both physical development, skill development for motor sports as well as individual training styles among athletes. The training program included:

1. After pre-tests, the first training session was on Monday, November 13, 2023.
2. The researcher after speaking with experts devised a number of arm, leg and balance-related exercises.
3. By using their body weight for sport specific training, these workouts aimed at increasing muscular strength in arms and legs as well as improving balance. 4. Three sessions per week (Monday, Wednesday, Friday) for eight weeks were conducted during the training period. Sessions were lasting between 25 and 40 minutes considering gender differences among players' age groups towards their levels of fitness relative to previous experiences encountered in athletic careers.
4. In total there were twenty four sessions held.
5. Specific goals were assigned for each session of the training.
6. The ripple ratio followed by this exercise program is 2-1
7. The trainer led the experimental group while the researcher supervised special practice
8. Training incorporated exercises into its main section such that it became an all-inclusive event.
9. Intervals or repetitions

2-7 Posttests:

After the trial period, on 8 January 2024 (Monday), a post-test was carried out for evaluation of physical and skill abilities in sample. The post-tests were according to the installation of a model with replication mode just like pre-tests and should have same feature in spatial and temporal.

2-8 Statistical methods:

The data was processed on a computer using statistical software SPSS version (24).

3. Research Results: Presentation, Analysis, and Discussion

3-1 Presentation and Interpretation of the Control Group's Physical and Skill Abilities Pre- and Post-Test Results:

The table (3) shows the arithmetic means and standard deviations for the pre- and post-test scores of a few chosen physical and skill-related tests for the control group. It also contains the significance level and the computed T-value (Sig), which enable an assessment of variations in the performance of the control group.

T	Variables	measuring unit	the test Tribal		Posttest		T	Sig	indication
			S	A	S	A			
1	The strength and speed of the arms	number	6,25	1,25	9,00	0,81	3,66	0,01	moral
2	The strength and speed of the legs	number	18,50	2,08	25,75	1,70	5,38	0,00	moral
3	Balance	Tha	15,75	1,70	23,50	1,29	7,24	0,00	moral
4	Handstand	degree	4,75	0,95	6,50	0,57	3,13	0,02	moral

3-2 Presenting and analyzing the results of the pre- and post-tests of the experimental group's physical abilities and skills:

Table (4) It shows the arithmetic means and standard deviations for the pre- and post-tests of some tests of skill and physical abilities and the value of (Sig) calculated and the significance level for the experimental group

T	Physical abilities and skill	measuring unit	the test Tribal		Posttest		T	Sig	indication
			s	A	s	A			
1	The strength and speed of the arms	number	6,50	1,00	11,50	0,57	8,66	0,00	moral
2	The strength and speed of the legs	number	19,00	2,16	29,75	1,70	7,80	0,00	moral
3	Balance	Tha	16,25	0,95	28,75	0,95	18,46	0,00	moral
4	Handstand	degree	4,50	0,57	8,50	0,57	9,79	0,00	moral

3-3 Presenting, analyzing and discussing the results of the post-tests of the physical and skill abilities of the control and experimental research groups:

Table (5) It shows the arithmetic means and standard deviations for the post-tests of physical abilities and skill for the control and experimental research groups.

T	Physical abilities and skill	measuring unit	Posttest for the control group		Posttest for the experimental group		T	Sig	indication
			s	A	S	A			
1	The strength and speed of the arms	number	9,00	0,81	11,50	0,57	5,00	0,00	moral
2	The strength and speed of the legs	number	25,75	1,70	29,75	1,70	3,31	0,01	moral
3	Balance	Tha	23,50	1,29	28,75	0,95	6,53	0,00	moral
4	Handstand	degree	6,50	0,57	8,50	0,57	4,89	0,00	moral

3-4 Discussing the results of the tests for the control and experimental research groups:

As can be seen from Tables (3, 4 and 5), the exercises performed by the trainer affected the control group remarkably. The control group's physical abilities and skills showed some improvement because of training and feedback that continued through the week. In this manner, incorporating selected exercises in to his program continuously trained over a period allowed to carry out effectively.

However, there was little improvement in the control group's physical tests compared to what was observed in experimental group. This is according to researchers who explain that special exercises carried out on members of this second group accounted for more apparent changes in their physical abilities. For instance, the researcher devised unique exercises which featured as part of only one section of the training sessions held by these participants. Not only did this introduce a new method

of training but it also made it possible for them to break up routines created by reliance on aids. Therefore, in terms of enhancing their bodily capabilities, these participants were trained better than those with whom they were under comparison. It concerns the various parts of the body in terms of the lower and upper limbs, and its primary goal remains the development of muscular strength of its various types and according to the times of its training. This may affect the development of abilities, as was shown in this study. The basis of the work is the use of tools and rubber ropes, the effectiveness of which many studies have proven in developing abilities. The athlete and his performance: The use of rubber ropes gives great freedom in using static and moving exercises. The first puts the muscle under constant influence by exerting force on the muscle in addition to stability exercises for a certain time and then movement to an extent in which the position is stabilized. As for the second, it places the muscle under stages of tension and relaxation in the manner of continuous movement. And with repetitions that are appropriate to what was put in the exercises, and all that was mentioned is to increase muscle strength, and this led to the sample improving in dynamic and static balance. One of the training methods that was assessed to determine its effects on balance is rubber rope exercises and balance tools.^(liii)

The researcher believes that there is a mutual relationship between strength and balance. It is possible for strength training to develop balance, and balance training can develop strength. The cause for the development of balance as a result of training is the property of the effect of rubber ropes on muscle contractions in the type of influence and activation of nerve impulses. The effect of rubber ropes has an aspect of the effects of balance on the muscle due to its elastic property and the permanent tension at the moment of contraction and extension. The application of the bodyweight training method had a notable influence in terms of improving one's physical abilities. With this method, players were able to remain focused on their training and engage actively and comfortably with the exercises because of the fun that came with having a personal approach to workouts. The combination of abilities and skills is an important component in creating a multifunctional and holistic player.

There was, however, great improvement which the researcher relates to the type of exercises given. Most of the player's working muscles were well exercised while paying attention to the coordination of movements. So in so definitely pioneering our development, some special exercises aimed for the strength development were crucial in this development since they contributed to strengthening ligaments and muscles and hence better performance.^{iv(1)}

As for its impact on physical abilities, including the speed-specific strength of the arms and the vertical jump, the researcher attributes the nature of the designed exercises, their specificity for each part, their times that are appropriate to the abilities, their frequency and intensity, and the difference in loads and auxiliary tools. It has proven effective as a training method to improve the speed-specific strength due to the possibility of placing the ropes in directions that allow movement in a smooth manner. Similar to movement^(v2). The researcher used various shapes in her exercises to develop the strength of the legs, some of which were ropes tied in the area of the feet, and some used the arms by attaching rubber ropes to them in order to give greater resistance to movement and exert greater intensity. In terms of improving the arms' quick strength, this method worked well. It has been shown that resistance training, especially using ropes, has the ability to positively alter the neuromuscular system's functional elements, such as muscle strength and endurance. Importantly, for such training to be effective, a suitable stimulus that encourages neuromuscular adaptation must be present. In order to maximize the functional benefits of the exercises, it is crucial to use training specificity to support and align with the targeted movement patterns.^(vi3)

We also notice an improvement in performance, and the researcher may attribute this to the experimental group's use and application of exercises that worked to develop this characteristic, and the ability of these exercises to accommodate motor weight while regulating muscle tension, body weight, and pivot reaction, and acquiring the art of motor performance, taking into account raising

the requirements for organizing movements and increasing the difficulty of movements. Gymnastics and focus on the guidance center, which determines motor amplitude and accuracy and links it to neuromuscular coordination (Hassanin, 1995)^(vii). and improving the level of performance.

The particular exercises created by the researcher are responsible for the experimental group's increase in technical skills as seen in the post-tests. When used during the training time, these activities greatly improved the players' skills and had a favorable impact on their growth. Exercise ^(viii) that closely resemble the technical performance of the targeted abilities are the main reason for the advancement. As a starting point, the study used bodyweight workouts. According to Ibrahim Shehata, "Special exercises are designed to develop and refine the correct performance of motor skills in gymnastics, and these exercises are characterized by a similarity to the fundamental technical performance of the skill." An important part of this process was the incorporation of assistive devices. These tools promoted continuous practice, made learning and training easier, and made movement performance easier. Their application also promoted a constructive and interesting training environment by assisting in overcoming anxiety and the possibility of failure ^(ix).

4-1 Conclusions:

The following are the conclusions made by the scholar:

- In terms of body capacity and skill, training with help devices significantly improves the abilities of the experimental group.
- Skill development using assistance tools helps both coaches and players to save time and effort.
- The control group was at a significant disadvantage to the experimental group which had a specialized training for every single variable in research.

4-2 Recommendations

Following the researcher's findings, the following suggestions were put forth:

- 1- Make using assistive aids a priority during training sessions because they are useful in improving the physical skills and abilities that were the subject of this study.
- 2- By using various training methods, especially interval and repetitive training approaches, gymnastics trainers can concentrate on enhancing athletes' physical and motor abilities.

Appendix:





The second week: Training units

The aim of the training unite: developing the physical and the mechanic ability and the skill of standing on both hands.

The intensity	The total time of exercise	The rest among sets	Sets	The rest among Repetition	Time	Repetition	Exercise	No.	
%80	5.2min.	120sec.	2	30sec.	8	4	Repeating standing on hands with balance tool without stability and with continuity	1	First week
	6.2 min.	120sec.	2	50sec.	16	8	Standing on hands with a balance tool .	2	
	6.2 min.	120 sec.	2	50sec.	16	8	Pulling rubber bonds forward down from sitting position on chair .	3	
	6.2min.	120sec.	2	50sec.	18	8	From lying position on the pulling device with two arms extended forward then getting back to the start position .	4	
	5.8 min.	120sec.	2	45sec.	11	12	Tighten the body exercise with tool on dipping machine for raising and lowering the body .	5	

Time of training: 30 min. of the main section

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