

Designing a Proposed Training Program Combining Weight and Flexibility Training and Its Effect on Physical Qualities and Digital Level of Shot-Put Female Players with F56 Disabilities

Hisham Ali Al-Aqra^{1*}, Shereen Mohammed Al-Mallahi²

¹ Technical Director of the Palestinian Paralympic Committee, Associate Professor of Sports Training at the Sports Training Department, Faculty of Physical Education and Sport, Al-Aqsa University, PO Box 4051, Gaza Strip, Palestine

² Physical Education Teacher and Athletics Coach for Individuals with Disabilities

Abstract: This study aims to identify the effect of designing a proposed training program, combining weight and flexibility training of shot-put female players with F56 disabilities on the physical qualities and digital level. It identified the effect of designing a proposed training program-combining weight and flexibility training on the physical qualities and digital level of shot-put players with F56 disabilities. An experimental method was used conducting this study, a sample of seven female players with disabilities from Al-Jazira Sports Club for Athletics for Persons with Disabilities. The study results revealed that weight and flexibility training improved both the physical qualities and the digital level. Muscle power of legs improved by 46.02%, muscle power of arms improved by 23.79%, maximum muscle strength of arms improved by 32.33%, muscular endurance of arms improved by 49.85%, flexibility improved by 29.83%, further, the digital level of shot-put improved by 15.18%. The significance of this study lies in firstly the combining weight and flexibility training, secondly revealing to what extent the aspects of physical qualities and the digital level of the shot-put female players with F56 disabilities have improved. Thus, the proper planning of any subsequent training programs ultimately aims to achieve advances in sports and sports competitions. The researchers recommended that it would be significant to continue implementing and developing the proposed program.

Keywords: weight training, flexibility, digital level, players with F56 disabilities.

設計一項結合重量和柔韌性訓練的擬議訓練計劃及其對F56殘疾鉛球女運動員身體素質和數字水平的影響方法

摘要：本研究旨在確定設計擬議的訓練計劃，結合重量和F56殘疾女子鉛球運動員柔韌性訓練對身體素質和數字水平的影響。它確定了設計一個擬議的訓練計劃結合重量和柔韌性訓練對F56殘疾鉛球運動員的身體素質和數字水平的影響。這項研究採用了一種實驗方法，樣本來自賈齊拉殘疾人田徑運動俱樂部的7名殘疾女運動員。研究結果表明，重量和柔韌性訓練提高了身體素質和數字水平。腿部肌肉力量提升46.02%，手臂肌肉力量提升23.79%，手臂最大肌肉力量提升32.33%，手臂肌肉耐力提升49.85%，柔韌性提升29.83%，進一步提升擊球數字化水平鉛球提高了15.18%，本研究的意義首先在於將重量和柔韌性訓練相結合，其次揭示了F56殘疾女子鉛球運動員在身體素質和數字水平方面的提升程度。因此，任何後續訓練計劃的適當規劃最終旨在實現體育和體育比賽的進步。研究人員建議繼續實施和開發擬議的計劃將非常重要。

关键词：重量訓練、柔韌性、數字水平、F56殘疾球員。

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About the authors: Hisham Ali Al-Aqra, Technical Director of the Palestinian Paralympic Committee, Associate Professor of Sports Training at the Sports Training Department, Faculty of Physical Education and Sport, Al-Aqsa University, PO Box 4051, Gaza Strip, Palestine; Shereen Mohammed Al-Mallahi, Physical Education Teacher and Athletics Coach for Individuals with Disabilities

Corresponding author Hisham Ali Al-Aqra, ha.alagrah@alqsa.edu.ps

1. Introduction

The scientific and technological advances we experience today are the hallmarks of the present times. They contribute to finding scientific solutions to many problems in various fields in general and in the field of Physical Education in particular through using scientific planning for training programs and relying on the results of Physical Education related studies.

Weight training has many benefits, including developing all kinds of muscle strength, developing speed and flexibility, increasing bone and ligament strength, and cartilage thickness, preventing injuries, improving metabolic processes, increasing self-confidence, and improving one's appearance [13].

Flexibility training is of great importance as it facilitates players' acquisition of different motor skills, contributes to saving energy, reduces performance time and helps perform movements in a smooth and effective manner. It also plays an effective role in delaying the onset of fatigue, in reducing the possibilities of muscle contractions and in recovering [19].

With the spread of parasports after World War II in many European countries in addition to Canada, India, Indonesia, Korea, Japan, Egypt, Saudi Arabia, Kuwait and most Arab countries, organized international competitions emerged. The Paralympics first occurred in Rome, Italy, in 1960 featuring 400 athletes from 15 countries. Parasports include high-level and international sports that are the Paralympic games. Parasport also has its own registered level records, including athletics. They include forms of adapted physical activities from existing able-bodied sports, according to certain disability classifications [14]. The disability ratio in the Palestinian society reached 2.1%, with a total of 92,710 persons with disabilities, 48% of whom are in the West Bank and 52% of whom are in the Gaza Strip, according to the General Census of Population, Housing and Establishments in 2017 [23].

Despite the great importance of engaging in sports activities, disadvantaged groups are deprived of their right to do so, such as persons with disabilities whose population is increasing due to the difficult conditions and the ongoing "Israeli" aggression against the Gaza Strip, which results in more amputations [16].

Sport in Palestine face many problems in leveling up due to many challenges that impede development in the field of sports in general and of athletics for individuals with disabilities in particular as athletics is one of the main competitive sports that requires players to have certain abilities, primarily challenging themselves to reach higher levels [7].

The increasingly new records obtained in athletics over the recent years are mainly attributed to the

investment in both the technical and physical abilities of female players. And thanks to using different disciplines of sports science and applying proper scientific regulations when arranging the training methods and programs, players and coaches achieved the highest levels possible [9].

The researchers believe that the main goal of the female shot-put player is to put the shot- the ball- as far as possible, on the ground, considering the rules and laws regulating the F56 shot-put competition.

Scientific research is considered the best method through which various scientific theories in the field of sports training can be verified, benefited from and adapted to serve sports and its development [6].

In this regard, many previous studies have confirmed the aforementioned. For instance, we have the study [16], which identified the effect of resistance training on the strength characteristics of speed and digital level of throwing the disc for people with special needs in the Palestinian team for athletics. It concluded that the training program considered the characteristics of the players with disabilities, and consequently, its results were reflected on the physical qualities and digital level for the skill of throwing the disc. We also have the study [11], which identified the effect of a training program to develop some physical and skill variables and the digital level for the shot-put students and concluded that improving the shot-put student's muscle strength and the digital level reflects greatly on their skills. Furthermore, we have the study [15], which identified the effect of motor ability training by supporting the reflex stretch on the physical abilities and the digital levels of the shot-put and concluded that the training program, supported by flexibility exercises, significantly affected the players' physical abilities and digital level. Moreover, we have the study [2], which identified the effectiveness of using weight training to improve the strength of the skills of the sideways somersault with one-quarter twist, and the back somersault, on the ground. It was concluded that weight training contributed to improving the strength of the player. Likewise, we have the study [6], which identified the effect of qualitative training on improving the special physical abilities and the digital level of the Al-Aqsa University shot-put team and concluded that the proposed program improved the special physical qualities and the digital level of the team players.

The significance of this study lies in combining weight and flexibility training and revealing to what extent the aspects of physical qualities and the digital level of the shot-put female players with F56 disabilities have improved, and thus the proper planning of any subsequent training programs,

ultimately aiming to achieve advances in sports and sports competitions.

Moreover, there is another importance for this study, hence it is an addition to the Palestinian corpus of scientific research in particular and to the Arab and foreign corpus in general, insomuch that it deals with athletics and shot-put female players with F56 disabilities.

When investigating, the researchers observed that the digital level of the shot-put female players with F56 disabilities did not improve significantly in years, as it only reached 4.22 meters. Nevertheless, the qualifying level (B secondary qualification) for the Paralympics under the F56 classification is 7 meters, which is not far from the shot-put female players' with F56 disabilities digital level, thus raising their level using a scientific based training program is possible.

Although the studies reviewed by the researchers confirm the significance of using weight and flexibility training, the researchers – to their best knowledge – did not find any previous Palestinian study, which dealt with the effect of training programs in the physical qualities and digital level of the shot-put female players with F56 disabilities. Therefore, the researchers endeavor to design a proposed training program combining weight and flexibility training and to determine its effect on the physical qualities and digital level of the shot-put female players with F56 disabilities.

This study aims to identify the effect of designing a proposed training program, combining weight and flexibility training of shot-put female players with F56 disabilities on the physical qualities and digital level.

The research hypothesis: Statistically, significant differences exist between the results of the pre- and post-measurements of improving the physical qualities and digital level of shot-put female players with F56 disabilities in favor of the post-measurement.

2. Methodology

The researchers adopted the experimental method, following the experimental training program design for one group, the pre- and post measurement.

Research sample and population size: 7 shot-put female players with F from Al-Jazira Sports Club for Athletics for Persons with Disabilities in the governorates of the Gaza Strip.

2.1. Definitions and Abbreviations

Below are definitions of key terms:

– Weight training: “A training system that contains a set of exercises performed with free weights and weight machines to improve muscle ability through the designed program” [5].

– Flexibility: “Individual's ability to perform sport moves by moving the joints, involved in that move, through its full range of motion” [18].

– Special physical qualities: “A set of physical

qualities and abilities related to skills performance in the practiced sports activity, which results from the analysis of performance from beginning to end, physically, motorically, muscularly, physiologically, and temporally” [8].

The next abbreviations will be used:

- Lying down with raising legs high, inclined, 15 times – A
- Throwing a 1-kg medicine ball to the farthest distance while sitting – B
- Bench press while lying down – C
- Hanging with raising knees to chest – D
- Raising arms high while lying down and holding a stick – E
- Shot-put digital level – F.

2.2. Training Program Design

The training program was constructed according to the reference studies related to weight and flexibility training. The training program lasts for 10 training weeks, with three training sessions a week, 30 training sessions. The experimental group performs a training session, which includes these three stages (warming up – training activity – cooling down), considering that the training activities vary according to the tools and exercises used in each training method. Weight training improves the muscular strength of the upper and lower extremities, and to improve the balance in the structural construction of the muscles of the right and left arms according to the principle of balance, to improve the digital level. The exercises focused on the flexor and extensor muscles of the upper extremity using weight training with certain repetitions. The intensity and type of weight used of dumbbells and barbells, the size and number of repetitions used and the intensity between exercises and between training sets controlled the degrees of weight training load. This was done in accordance with the goal of the program and the research sample, and in the application of the principles of progression and undulation in the intensity of the training load B [5] within the period from 25-12-2021 to 03-03-2022.

3. Results

Table 1 shows that the highest value of skew coefficient is 1.67 and the lowest value is -0.38, which indicates that there are no problems with the study sample regarding the normal distribution of the variables under study.

Scientific coefficients of validity and reliability of physical tests: to investigate the validity and reliability of the physical tests, the researchers conducted the validity test in an experimental group, made of two female players, and in a control group, made of two female players not belonging to the study sample and not committed to the training program on Saturday 18-12-2021. The reliability test was conducted on the experimental group from Saturday 18-12-2021 until

Thursday 23-12-2021. The following are the results of the validity and reliability tests, as shown in Tables 2 and 3.

Table 1 Arithmetic mean, standard deviation, median, and skew coefficient for the research sample: basic and experimental variables (n = 7)

Variables	Unit	Study Sample		Median	Skew Coefficient
		Arithmetic Mean	Standard Deviation		
Key Variables					
Height	cm	155	7.89	155	0.84
Weight	kg	64.7	13.23	63	-1.67
Age	Month Year	30.43	4.86	30	1.28
Training Age	Month Year	7.29	2.75	7	1.8
Experimental Variables					
A	s	54.86	1.07	53	-0.77
B	cm	7.27	1.42	7.3	-0.19
C	reps	60.71	28.35	70	-1.07
D	reps	24	24.23	11	0.38
E	cm	37.29	6.32	36	1.39
F	cm	4.22	0.94	4	0.98

Table 2 shows statistically significant differences between the two groups in the physical tests in favor of the experimental group, which indicates the validity of the tests under study. The T value ranged between 2.57 as the lowest value, and 7.14 as the highest value. By comparing the tabulated T and the calculated T values, it is possible to find the level of significance, which indicates a high degree of the validity of the tests.

Table 2 Validity coefficients of the studied physical exercises of the experimental and control groups for the physical variables (n = 6)

Variables	Unit	Experimental group		Control group		MD	T Value
		M	S.D	M	S.D		
A	s	66.67	5.03	88.33	1.53	21.66	7.14
B	cm	6.1	1.11	5	0.89	1.1	3.82
C	reps	53.33	28.87	26.67	10.97	26.66	2.57
D	reps	9.67	2.31	6	2	3.67	3.92
E	cm	29.33	1.53	15.33	3.79	14	2.63
F	cm	3.02	0.18	2.59	0.21	0.43	3.88

Note: Tabular T-value at the level of 0.05 = 2.132

Table 3 shows a statistically significant correlation between the first and Second applications at a significance level of 0.05. The value of the correlation coefficient R ranged between 0.982 as the lowest value, and 0.996 as the highest value. By comparing the value of Tabular (R) and of Calculated (R), a significance level is found that indicates a high degree of the tests' reliability.

Table 3 Reliability coefficient of the studied physical exercises of the first and second applications (n = 3)

Variables	Unit	First Application		Second Application		R
		M	± S.D	M	± S.D	
A	s	66.67	5.03	67	4	0.993
B	cm	6.1	1.11	5.87	1.16	0.995
C	reps	53.33	28.87	47.67	22.28	0.998
D	reps	9.67	2.31	11	2.65	0.982
E	cm	29.33	1.53	29.67	2.08	0.996
F	cm	3.02	0.18	2.98	0.18	0.996

Note: Tabular R-value at the level of 0.05 = 0.9

4. Discussion

Table 4 shows statistically significant differences in the pre- and post measurement of the physical tests. The data analysis in the above table shows the following: the improvement rate of lying down with raising legs high, inclined, 15 times (Muscle power of legs) test is 46.02%, the improvement rate of throwing a 1-kg medicine ball to the farthest distance while

sitting (Muscle power of arms) test is 23.79%, the improvement rate of the bench press while lying down (maximum muscle strength of arms) test is 32.33%, the improvement rate of hanging with raising knees to the chest (muscular endurance of arms) test is 49.85%, the improvement rate of raising arms high while lying down and holding a stick (flexibility) test is 29.83%.

Table 4 The difference between pre and post measurement, the two-arithmetic means, the rate of change, and the calculated (T) value (n = 7)

Variables	Unit	Pre measurement		Post measurement		DM	ROC %	T value
		M	S.D	M	S.D			
A	s	54.86	1.07	37.57	1.72	47.86	46.02	-18.31

Continuation of Table 4								
B	cm	7.27	1.42	9.54	1.8	2.27	23.79	6.87
C	reps	60.71	28.35	89.71	36.18	29	32.33	6.22
D	reps	24	24.23	47.86	29.36	23.86	49.85	6.78
E	cm	37.29	6.32	53.14	8.59	15.85	29.83	10.34

Note: Tabular T-value at the level of 0.05 = 1.943

Based on the results in the previous table, the researchers attribute the changes occurring in the improvement rate of the physical qualities to the scientific approach they used when designing the training program, which considered the female players' physical and digital abilities during the application of training units, and disability in terms of F56 classification, as the exercises agreed with their physical abilities (the disability).

This result agrees with the results of many previous studies like [11], which concluded that muscle strength is one of the most important physical influencing factors as it controls the achievement of the farthest distance. The stronger the muscles, the more efficient the flexion and extension, as if the muscles of arms are not strong enough, the player's performance will be impaired.

Additionally, the study [15] concluded that many physical elements help the throwing and push contestants to achieve the best results while saving the effort, as flexibility is one of the most important capabilities that require the contestants to develop because of its influential role on the results of the competition. Flexibility also improves the work of dynamic forces during performance; thus, attention must be paid to performing stretching exercises before entering specialized sports training programs.

Moreover, the results of [2] also agree that training programs using weights have positive results in improving the muscular strength of the players.

The study [4] indicated this and concluded that physical preparation depends on scientific theories that work on using the maximum potential of the player's abilities to reach the highest possible level to reach the level of competition, and that physical qualities work mainly to improve the level of performance.

Furthermore, the study [1] confirms this and concludes that current research indicates that resistance training can be a safe, effective and worthwhile activity for children and adolescents provided that qualified

professionals supervise all training sessions and provide age-appropriate instruction on proper lifting procedures and safe training guidelines.

The study [21] indicates this and states that based on the available studies, an individualized multicomponent exercise program that includes aerobic activity, strength exercises, and flexibility is recommended to treat frailty.

This result also agrees with the study [20] that states that the treatment program should be individualized with specific strengthening and flexibility exercises to achieve the dynamic stability that is required for overhead function.

The study [3] also confirms this and states that physical preparation in relation to the thrower's level is considered one of the most important factors affecting the throwing distance. Muscular strength, speed, and strength characterized by speed, agility and flexibility represent other factors. The thrower's level depends on the player's extent of his or her explosive power to throw the tool in highest speed possible, mainly when pushing.

Thus, the researchers believe that when using both weight and flexibility training in the same training program, it improves physical qualities more significantly. This totally agrees with the study [19], which indicates that reaching high sports levels should apply different scientific training programs in accordance with the activity and players.

The discussion of the findings of the second hypothesis, which suggests that there are statistically significant differences between the results of the pre and post measurements of improving the digital level of shot-put female players with F56 disabilities, in favor of the post measurement.

Table 5 shows that there are statistically significant differences in the pre- and post-measurement of the digital level test results. The data analysis in the above table shows that the improvement rate of shot-put digital level is 15.18%.

Table 5 The difference between pre and post measurement, the two-arithmetic means, the rate of change, and the calculated (T) value (n = 7)

Experimental Variables	Measurement Unit	Pre measurement		Post measurement		DM	ROC %	T value
		M	S.D	M	S.D			
F	cm	4.22	0.94	5.04	0.89	0.82	15.18	*3.72

Note: Tabular T-value at the level of 0.05 = 1.943

Based on the results in the previous table, the researchers confirm that the use of weights and flexibility training has brought about a significant improvement in muscular strength in its various sections and flexibility, which is reflected in the digital level of the shot-put skill.

Additionally, the exercises used in the proposed training program included exercises similar to performance of the skill in terms of the neuromuscular pathway, working muscles and performance form, and thus contributed to improving the neuromuscular memory within the muscles leading to improving

muscular ability and hence the digital level.

These results agree with the results of many previous studies like [22], which indicated that players' regular attendance in the scheduled training programs and their desire, efficiency and love for training have a positive impact on the development of physical abilities, which in turn improved the level of digital performance.

Additionally, [10] concluded that the strength training program helped improve the physical variables and digital achievement of the shot-put contestants, as the training program that contains special exercises to improve muscle strength similar to the technical performance of the shot-put and regularity in training helped improve physical variables and digital achievement.

Moreover, the results of [17] also confirm that the training program improved physical variables and efficiently reflected on the digital performance level of the long jump skill.

The study [12] also indicates this and states that being guided by the content of standardized training programs and using various tools improved the digital level of shot-put.

Furthermore, the study [3] affirmed that the level of the throwing players depends on how much muscular ability they must throw the tool with the greatest power possible when pushing.

5. Conclusion

The combination between weight and flexibility training was the first parameter. The second one was the improvement of the physical qualities and the digital level of the shot-put female players with F56 disabilities.

Statistically, significant differences exist between the results of the pre- and post-measurements of weight and flexibility training on improving the physical qualities of the shot-put female players with F56 disabilities. The muscle power of legs improved by 46.02%, the muscle power of arms improved by 23.79%, the maximum muscle strength of arms improved by 32.33%, whereas the muscular endurance of arms improved by 49.85%, and flexibility improved by 29.83%.

Statistically, significant differences exist between the results of the pre and post-measurements of weight and flexibility training on improving the digital level of the shot-put female players with F56 disabilities, as the shot-put digital level improved by 15.18%.

This study recommends the necessity of the following:

- Directing the trainers and those in charge of the training process to use the necessary aids suitable for the type of activity and the nature and type of disability.
- Considering safety regulations when training

female players with disabilities.

- All the specialists in sports training, parasport, medical rehabilitation and biomechanics should cooperate to develop more integrated programs.

- The use weight and flexibility training programs in other sports because of their positive impact on improving the physical qualities and the digital level of players with disabilities.

- The content of the proposed training program for weight and flexibility training should be used as a guide.

6. Limitations and Further Study

This study has several limitations:

- *Objective:* This study was applied to find the effect of the proposed training program-combining weight and flexibility training on the physical qualities and digital level of shot-put female players with F56 disabilities.

- *Population size:* (7) shot-put female players with F56 disabilities from Al-Jazira Sports Club for Athletics for Persons with Disabilities.

- *Time:* The study was implemented from 25-12-2021 to 2-3-2022, with duration of 10 training weeks.

- *Place:* The study was conducted among the governorates of the Gaza Strip in Palestine at Al-Jazira Sports Club stadium, and Al-Rantisi and Al-Wazir sports stadiums – Higher Council for Youth and Sports.

It would be significant to continue implementing and developing the proposed program and conduct more research to compare other training methods to determine the extent to which each method contributes to different athletics skills.

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