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Effect of training program using medicine balls on some physical abilities of wheelchair basketball players

Charara ALIA[1], Houcine BENZIDANE [2*], Djamel MOKRANI[31]

Abstract

Aim. The researchers seek to identify the effect of physical program using medicine balls on some physical abilities of wheelchair basketball players.

Material and method. The sample was selected by the intended manner including 20 players'. Split into two equal groups (experimental 10 players, control 10 players) of national championship in Algeria for the sports season 2022/2023. As protocol experiment, our physical program for the experimental group was applied under researchers' supervision, All the tests practised (pre-test and pos-ttest) were conducted with the same team and in the same condition based on speed test (20 m), strength test (pushes the medicine ball) and agility test (t-test).

Results. After the results treatment statistically, it was clear that using the medicine balls in physical program is positive to the development of level some physical abilities for persons with motor disabilities, and the differences between measurements in pre-test and post-test for the research sample were in favor of the post-test results (*p≤0.05).

Key words: *Physical program, medicine balls, physical abilities, wheelchair basketball players*

[1]Laboratory of Programs Optimization in APS, Institute of Physical Education and Sports, University of Mostaganem, Algeria

[2]Laboratory of Programs Optimization in APS, Institute of Physical Education and Sports, University of Mostaganem, Algeria

[3]Laboratory of Programs Optimization in APS, Institute of Physical Education and Sports, University of Mostaganem, Algeria

Introduction

Participation in regular physical activity is considered to be an essential part of the rehabilitation process among individuals with chronic disabilities (Bhambhani 2002), hence, the evaluation of physical capacity can give an indication of the potential level of activity, participation and quality of life (Noreau & Shepphard 2015).

Wheelchair basketball is one of the most popular Paralympics sports, with growing popularity and international competitions being held around the world. The growing level of professionalism and growing interest demand a more scientific view of the sport. Wheelchair basketball is played by two teams made up of individuals with compromised lower limbs, by amputation, paralysis. As it is a high intensity intermittent/interval sport (Bloxham & al. 2001) it is important that athletes have physical skills such as speed, agility, strength, power, endurance and technical skills such as pushing, turning, kicking, hitting, dribbling, throwing, passing and catching the ball (Gil et al. 2015). Wheelchair basketball (WB) is an intermittent sport, which combines repeated high-intensity sprints and rapid accelerations and decelerations with moderate and low-intensity actions, with the purpose, among other aims, of achieving or maintaining a good position on the court (Molik & al. 2010).

Therefore, wheelchair basketball coaches must include special exercises in their training program to improve the condition of their players: such as weight training and speed training, Endurance training and exercises for specific muscle groups. Developing offensive and defensive skills helps with conditioning (Green 1999). It is well known that sport is a very good tool for the rehabilitation of individuals with disability (Miyahara et al. 2008; Sporner et al. 2009). Wheelchair users who participate in some type of physical activity had better pulmonary functions, muscular strength, endurance and anaerobic power in comparison to those who do not (Wells & Hooker1990).

Looking at the wheelchairs basket ball's in physical terms, we can see that special strength is the main feature in forming physical fitness. If a player wants to excel in the physical performance and in skills, one should have physical fitness in one way or another particularly she depends on the arms in playing. This is not achieved if there are no trainings for the special strength without neglecting other elements for physical fitness such as speed, endurance, flexibility, fitness, harmony, precision etc. These elements contribute to any skills or physical activities (Ali 2021).

Training using medicine balls is one of the modern non-traditional training methods and forms that have emerged as a direct result of the scientific renaissance in the field of sports training for the purpose of bringing players to the pinnacle of athletic achievement through the use of medicine balls in pushing, throwing and passing exercises, which can be performed individually, in pairs, or in a group. Adopting different positions and forms, whether standing, kneeling, sitting, lying down, or hanging (salameh 2020).

And Savithiri (2016), Ignjatovic et al (2012b) Faigenbaum & Mediate (2005) indicated that training using medicine balls contributes significantly to developing physical abilities related to muscular strength, speed, agility, and balance. Pramod & Divya (2019) states that training using medicine balls is a good way to develop muscle strength, which is an essential component of all artistic movements and skills.

Some studies have touched on the use of weights and medicine balls within training programs because of their importance in improving the level of physical fitness elements related to sports, as a study Thanuraj & al (2022), Salameh (2020), Pramod & Divya (2019), Savithiri & Kumaresan (2016), Skucas (2012) and Ignjatovic et al (2012b) adds to the development physical skills is a very important part of preparing for wheelchair basketball competitions. The development level of disabled wheelchair basketball player has a great influence on the final results and future athlete's perspective of the disabled person.

Wheelchair basketball players' and team's results depend mostly on the physical skills and abilities level. This issue has not been researched much. Possibilities for applying for various wheelchair basketball programs and their efficiency in developing wheelchair basketball players' physical skills in order to achieve high results have not been researched much (Valandewijck & al 1999). Current research highlight mainly the issues of improvement of sports training, pedagogical and psychological aspects of support for athletes with disabilities, methods of disabled people integration in modern society, physiological changes in the body under the influence of physical activity (Bashkin & Makarova 2012; Kravchenko & Chkhajlo 2008). With the increasing number of players involved in sports, teams raise concerns about training and fitness issues, as well as is the insufficient number of qualified trainers in wheelchair basketball. Since the above, our investigation in the present study based on the most effective method of increasing the physical and athletic performance. Applying exercises using medicine balls to improve some of the physical abilities of wheelchair basketball players.

Objectives

The objective of the study was to identify the effect of medicine balls in training program to improve some physical abilities of wheelchair basketball players. And detect differences between control and experimental sample in some physical abilities under consideration among wheelchair basketball players.

Materials and method

Methodology

Researchers used the experimental method by choosing two groups. One of their experiment and the other control.

Participants

Twenty male wheelchair basketball athletes from two different clubs in the same league (national league in Algeria) participated in the study. Their ages between 22 and 35 years, and their mean competitive experience was 8, 3 years.

The sample was selected by the intended manner including 20 players', the group experimental sample 10 players and control sample 10 players of the sports season 2022/2023.

Knowing that each team consists of 12 players (a total of 24 players), and work was conducted with 10 players from each team, excluding two players from each team who received a sports rating of 1 and 1.5 (work was conducted with players with a rating ranging from 2 to 4.5 only).

Physical tests

Test (01): Speed test 20m (Vanlandewijck et al1999)

Test (03): Strength test (push the medical ball by hands 2 kg)

Test (04): Agility test (t- test) (Sassi et al 2009)

Training program

The proposed training sessions were held on October 4, 2022 until the end of November 30, 2022 during evening training sessions.

The researchers implemented the training program that aims to develop some of the physical abilities of wheelchair basketball players through the use of medicine balls of different weights within the training units. The program included three (03) training units per week, consisting of six (08) weeks.

Medicine balls were used in the experimental group of wheelchair basketball players in the main stage of the training unit at a rate of 20 to 30 minutes.

Data Analysis

Statistical analysis was performed using SPSS software (version 23). The results are presented as the mean ± standard deviation (SD). The mean and standard deviation were calculated with the measured results, paired T-test was applied for mean difference test between groups. Statistical significant level was set at α=0.05.

Results

View and analyse the results of tribal and remote tests of the experimental and control sample

Table 1. Comparing the results of tests (pre and post-test) of the experimental sample

Tests	Pre-test Mean ± SD	Post-test Mean ± SD	T Calculated	P	Change %
Sprint test (20 m)	7.16±0.51	6.58±0.30	4.17	*0.00**	*8.10*
Strength test	6.48±0.59	6.91±0.51	3.77	*0.00**	*6.63*
Agility test	17.47±1.51	17.00±1.32	3.98	*0.00**	*2.76*

For the experimental sample, Illustrated by table number (01) that all values T calculated that is greater than the value of T tabular estimated 1.81 at degree of freedom 9, and level of indication 0.05, which confirms the presence of significant differences between the averages of statistical significance, and in favor of post-test for experimental sample. We also note that the percentages of change were in favor of the post-test results (8.10; 6.63 and 2.76%).

Table 2. Comparing the results of tests (pre and post-test) of the control sample

Tests	Pre-test Mean ± SD	Post-test Mean ± SD	T Calculated	P	Change %
Sprint test (20 m)	7.21±0.32	6.92±0.31	2.82	*0.00**	*4.0*
Strength test	6.31±0.62	6.55±0.52	2.27	*0.01**	*3.8*
Agility test	17.61±1.49	17.32±1.37	2.27	*0.01**	*1.64*

For the control sample, Illustrated by table number (02) that all values T calculated that is greater than the value of T tabular estimated 1.81 at degree of freedom 9, and level of indication 0.05, which confirms the presence of significant differences between the averages of statistical significance, and in favor of post-test for experimental sample. We also note that the percentages of change were in favor of the post-test results (4.0; 3.8 and 1.64 %).

Compare the results after tests between experimental and control samples

Table 3. Comparison of dimensional results

Tests	Control Mean ± SD	Experimental Mean ± SD	T Calculated	*P*
Sprint test (20 m)	6.92±0.31	6.58±0.30	2.83	*0.012**
Strength test	6.55±0.52	6.91±0.51	2.4	*0.010**
Agility test	17.32±1.37	17.00±1.32	0.56	*0.052*

T tabular=2.10, p=0.05

There are statistically significant differences between the experimental group and the control group in favor of the post-test in the experimental group, because the calculated T is greater than the tabular T, and p≤ 0.05, except the agility test, Where T was calculated 0.56 and is smaller than the value of the T tabular (p>0.05) as shown in the table 3.

Discussions

Developing physical abilities is a very important part of preparing for wheelchair basketball competitions. The development level of disabled wheelchair basketball player has a great influence on the final results and future athlete's perspective of the disabled person. Physically disabled persons have difficulty moving and have to adjust to a new way of moving around. It is necessary to reorient, acquire new knowledge and wheelchair control skills.

Through the results in tables (01) and (02) which shows the difference between the averages before and after for the sample experimental and control in tests (speed, strength, agility) , which is in favor of post-test measurements, and the percentages of change were in favor of the post-test results for both samples. Which confirmed the effectiveness of the use of physical training program in improving physical abilities, and the control sample results achieved statistically function, but the differences were for the experimental sample, because the proposed physical training program using medicine balls it was based on scientific foundations of the application of physical exercises of quality that are related to the game, the exercises began with simple loads, which gave the opportunity to focus on performing with high efficiency while increasing the number of repetitions during performance.

Where those results line with outcomes proved by Savithiri (2016), Faigenbaum & Mediate (2005), Knechtle & Köpfli (2001), DePauw & Gawron (1995) that the benefits training program for persons with disabilities should comprise the progression of the five major physical abilities which are endurance, flexibility, coordination, strength, and speed. Approved by Skucas (2012) that in resistance as quality physical qualitative of the anaerobic endurance relating to the intensity of loads work that is a very important feature in wheelchair basketball. Admit by Bruneli & al (2006) in time and special attention, to developing wheelchair basketball players' physical skills. Comment by Bruneli & al (2006), Molik and Kosmol (2001) in agility correlate to quickly in changing direction. Agreed by the researchers in the improvement of weighted basketball balls players' as an additional work, which can improve this motor ability, reported as a traditional method in twelve weeks according to the similar. The results coincide with the results of another researcher (Benzidane et al 2017), and Savithiri (2016), Faigenbaum & Mediate (2005) indicated that training using medicine balls contributes significantly to developing physical abilities related to muscular strength, speed, agility, and balance. Pramod & Divya (2019) states that training using medicine balls is a good way to develop muscle strength, which is an essential component of all artistic movements and skills.

In the (Table 3) shows that there are statistically significant differences in post-tests between control and experimental samples in favor of the experimental sample in the tests of physical abilities, due to the use of medicine balls in the training program which contributed positively to improving the muscular strength of the upper extremities of athletes, which is considered an important element of physical fitness. The researchers attribute the higher improvement rates for the experimental group than the control group to the effect of regular training using medicine balls, which contains directed exercises, which are appropriate to the individual differences of the experimental group members. And Shahinaz (1994), Hugh Bin et al (2013) indicated that disabled basketball players rely entirely on the strength of the arms in their movements and movements, whether using crutches or a wheelchair. In addition to performing all basic skills, developing the explosive ability of the arms of disabled people has a positive effect on the performance of motor skills in various sports activities. Salameh (2020) confirms that performing throwing and pushing movements using medicine balls achieves an improvement in explosive power, strength characterized by speed, and strength endurance of the upper limb of the body, considering that they are plyometric exercises. These results are in line with the findings of the study Thanuraj & al (2022), Pramod & Divya (2019), Savithiri & Kumaresan (2016) about the importance of using

medicine balls in training programs to improve the elements of physical fitness and motor and artistic skills, Ozmen et al (2014) also found that a short-duration (6-week) explosive strength training program in wheelchair basketball athletes results in significant improvements in sprint and agility performance.

Although. Our results are in conformity with the judgment provides by Goosey-Tolfrey (2010) that WB is a physically demanding team sport that requires a high degree of skill, technical expertise, and teamwork. Acceleration, speed, and agility are of particular importance since the game is often played at a fast pace and excellent chair and ball skills are fundamental to the game. A high level of conditioning is required to maintain work intensity and to prevent injury. This touched him Yanci J & al (2015) in his study agility, strength and endurance capacity in wheelchair basketball players.

finally, the researchers appreciate that the diversification of the content the physical training program using medicine balls to improve the level of elements performance under study [speed, strength, agility], because physical exercices with and without ball as a plus resistance increase strength, power flexibility, endurance and stability to have good performance on field. However. This is of great importance to the possibilities of applying for wheelchair basketball programs in the investigation of the integral development of disabled person's physical and technical abilities. Appreciation in this modest study in the use of training program as the effective tool to improve physical abilities for wheelchair basketball players.

Conclusion

Researchers suggest that the proposed training program using exercises using medecine balls (8 weeks) has a positive impact on the physical abilities of wheelchair basketball players. Approve in this study as addition task which can improve the resistance correlate to six weeks to develop sprint training appreciate in the improvement of maximum speed phase of sprinting (20 meters) and resisted strength training (push medicine ball) related to the progress of the acceleration phase of sprinting (t-test) associated with agility in change direction (agility). Finally, participation in physical activities and training programs makes an important contribution to the fitness of individuals with physical disabilities. Therefore, basketball participants must maximize their performance through a combination of strength and endurance.

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