EFFECT OF USING WEIGHTED BALLS ON PERFORMANCE SPEED IN WHEELCHAIR BASKETBALL PLAYERS

Benzidane Houcine, Menad Fodil, Ahmed benklaouz Touati

*Laboratory of Programs Optimization in APS, Institute of Physical Education and Sports,
University of Mostaganem, Algeria*

Summary: The researchers seek to identify the impact of weighted balls on performance speed in wheelchair basketball players. Where the researchers used an experimental method in conformity with research nature between pre-tests and post-tests for the sample research. The sample was selected by the intended manner and divided into two equal groups (10 players experimental sample, 10 players control sample) for the 2019/2020 sports season. A speed test (5 m and 20 m without ball), speed test (5 m and 20 m with ball) were used. After statistical treatment of the results, the researchers concluded: The weighted balls are important to develop performance speed in wheelchair basketball players, and the best improvement of the experimental group based on of weighted balls is marked comparing to the control group. A regular physical training with weighted balls is very important to improve of performance speed of persons with disabilities in basketball game.

Keywords: weighted balls, performance speed, wheelchair basketball players.

Introduction

Wheelchair basketball is one of the most popular sports among the Paralympics disciplines and is practiced by people with different disabilities. And it is one of the most popular sports for disabled (Filoramo 2007). It is a team sport that requires physical effort and 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 superior level of conditioning is required to maintain work intensity and to prevent injury (Goosey-Tolfrey 2010, 2002).

The training program for persons with disabilities should comprise five major motor abilities that are endurance, flexibility, coordination, strength, and speed (DePauw & Gavron 1995; Knechtle & Köpfli 2001). Rudenko (2014) has carried out a number of researches on the effect of physical therapy measures upon physiological condition of athletes with disabilities (Rudenko 2014).

Wheelchair basketball (WB) trainers should include special exercises beside these drills in their training program to enhance the condition of their players: weight training, speed training; endurance training; and exercises for special muscle groups. Developing offensive and defensive skills aids to conditioning. Sprints, repeated often enough to improve your wheelchair handling and supervised weight training to help improve the strength of muscle groups used in wheelchair basketball should be dispersed in the training both before and during the competitive season (Green 1999).

Just as sprints are repeated often enough to improve your wheelchair handling and supervised weight training to help improve the strength of muscle groups used in wheelchair basketball should be dispersed in the training both before and during the competitive season (Owen 1982; Green 1999).

Some of the previous studies focused mainly on 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 (Yun-A & Won-Ho 2018; Köse 2018; Benzidane et al. 2017; Bashkin & Makarova 2012; Kravchenko & Chkhajlo 2008; Bozon & Vanlandewijck 2007).

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 & Hooker 1990). Therefore, participation in sport has the potential to act as a vehicle of health and fitness for those individuals with disabilities. As more persons participate in sports, teams are raising concerns about training and fitness issues, increased physical weakness and motor performance of persons on wheelchairs and it is the participation of some teams in the competition without regular training or absence from training all this led us to think about the application of exercises using the weighted balls in training program to improve performance speed in wheelchair basketball players.

Objectives

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

Methods

Methodology: Researchers used the experimental method by choosing two groups, one experimental and the other control.

Participants: Twenty (20) male wheelchair basketball athletes from two different clubs in the same league (national league) participated in the study, in age between 23 and 31 years. The two teams were randomly assigned to the group experimental sample: 10 players from a team of Mostaganem (Algeria). Moreover, control sample: 10 players from a team of Oran (Algeria), of the sports season 2019/2020.

Tests applied

Test (01): Sprint test (05m)

Test (02): Sprint test (20 m)

Test (03): Sprint test (05 m with ball)

Test (04): Sprint test (20 m with ball) (De Groot et al. 2012), (Vanlandewijck et al.1999).

Training program

- The proposed training sessions were held on September, 09th2019 until the end of October, 18th2019 during evening training sessions. After defining the physical exercise program using weighted balls, the researchers applied this training program, which aims to develop speed performance of wheelchair basketball players. The program included three (03) training units in a week of six (06) weeks.
- Weighted 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.

Weighted ball exercises:

- Passing and receiving exercises
- Conversational exercises in place
- Conversational exercises with mobility

- Speed exercises without and with weighted balls
- Dribbling exercises.

Data Analysis

The results are presented as the mean $\pm$ 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 $\alpha=0.05$.

Results

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

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

Tests	Pre-test	Post-test	T Calculated	P
	Mean $\pm$ SD	Mean $\pm$ SD		
Sprint test (05m)	2.85 $\pm$.049	2.66 $\pm$.034	1.52	0.071
Sprint test (20 m)	6.61 $\pm$ 0.32	6.26 $\pm$ 0.31	2.42	0.041*
Sprint test (05 m with ball)	.431 $\pm$.062	4.11 $\pm$.052	1.97	0.037*
Sprint test (20 m with ball)	8.42 $\pm$ 0.42	8.11 $\pm$ 0.31	2.07	0.045*

T tabular=1.83, p=0.05

There are statistically significant differences between the pre-test and the post-test in favor of the post-test in the control group, because the calculated T is greater than the tabular T, and $p \leq 0.05$ in the applied tests, except the speed test (sprint 05 m without ball), where T was calculated 1.52 and is smaller than the value of the T tabular (table1).

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

Tests	Pre-test	Post-test	T Calculated	P
	Mean $\pm$ SD	Mean $\pm$ SD		
Sprint test (05m)	2.71 $\pm$.049	2.35 $\pm$ 0.32	2.42	0.039*
Sprint test (20 m)	6.56 $\pm$ 0.51	5.90 $\pm$ 0.30	3.47	0.042*
Sprint test (05 m with ball)	.448 $\pm$.059	4.07 $\pm$.051	2.86	0.040*
Sprint test (20 m with ball)	8.16 $\pm$ 0.51	7.80 $\pm$ 0.32	1.98	0.033*

T tabular=1.83, p=0.05

There are statistically significant differences between the pre-test and the post-test in favor of the post-test in the experimental group, because the calculated T is greater than the tabular T, and $p \leq 0.05$ in the applied tests as shown in the table 2.

Comparison of dimensional results

Table 3
Compare the results after tests between experimental and control samples

Tests	Control	Experimental	T Calculated	P
	Mean $\pm$ SD	Mean $\pm$ SD		
Sprint test (05m)	2.66 $\pm$.034	2.35 $\pm$ 0.32	2.06	0.041*
Sprint test (20 m)	6.26 $\pm$ 0.31	5.95 $\pm$ 0.30	2.14	0.042*
Sprint test (05 m with ball)	4.11 $\pm$.052	4.07 $\pm$.051	1.16	0.076
Sprint test (20 m with ball)	8.11 $\pm$ 0.41	7.80 $\pm$ 0.32	1.94	0.036*

T tabular=1.73, 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 $p \leq 0.05$ in the technical test, Except the speed test (sprint 05 m with ball), Where T was calculated 1.16 and is smaller than the value of the T tabular ($p > 0.05$) as shown in the table 3.

Discussion

Depending on the statistically processing, in the (Table2), there are significant statistical differences in the pre-test and post-test in the experimental sample in speed performance (sprint without and with ball). According to the researchers this results was the results of the proposed training program based on scientific foundations of the application of physical exercises of quality that are related to the game, especially the use of the weighted balls [06 weeks & 03 training units in one week]. Where those results line with outcomes proved by (Coutts 1990; DePauw & Gawron 1995; Knechtle & Köpfli 2001) that the benefits training program for persons with disabilities should comprise the progression of the major physical abilities, which are endurance, flexibility, coordination, strength, and speed.

Giacobbi et al (2008), exercise and sport may be more important for individuals with disabilities because of their limited physical activity. In people with disability, sport and exercise participation can improve both physical and psychological health problems (Giacobbi et al. 2008). Because wheelchair basketball (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 (Goosey-Tolfrey 2010). Upper-extremity muscle strength is important for wheelchair athletes (Wang & Chen 2005; Ozmen et al. 2014; De Groot et al. 2012).

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 speed performance, due to the use of weighted balls in the training program. There are several studies that have measured sprint performance without and with the ball in wheelchair basketball players (Vanlandewijck et al.1999; Yanci et al. 2015; Hunter et al.1993). Chahinaz (1994), Hyo-Bin et al. (2013) noted that disabled basketball players rely entirely on the strength of the arms in their movements and movements, whether through crutches or wheelchair. In addition to the performance of all basic skills, and therefore the development of explosive capacity because of special exercise has contributed significantly to the development of the accuracy of long handling performance. From above the shoulder in the members of the research sample, and this is confirmed by many studies on the importance of the explosive power of the arms of the disabled and the impact of the positive effect of the performance of motor skills in various sports activities. And yessis (2003), bouzakaria et al (2018) adds that is necessary for the trainers to take part of the physical preparation of weight training to develop the muscular system of the athlete, with the development of certain physical attributes such as strength and speed.

As a summary of what has been achieved the researchers appreciate that the diversification of the content of the exercises using weighted balls improve the level of performance speed, because training in basketball as a plus tool increase strength, speed, 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 with weighted balls as the effective tool to improve speed performance (sprint without and with ball) among wheelchair basketball players.

Conclusions

Researchers suggest that the proposed training program using weighed balls has a positive impact on performance speed (sprint without and with ball) of wheelchair basketball players. It was approved in this study as addition task which can improve performance speed after six (06) weeks to develop strength training appreciated in the improvement of maximum speed phase of sprinting (05 and 20 meters), strength training related to the progress of the acceleration phase of sprinting (05 and 20 meters with ball) of wheelchair basketball players.

Thus, this study showed that regular physical training is very important to improve speed performance of persons with disabilities, through the use of wheelchair basketball as a regular activity of high density for people with motor disabilities.

Acknowledgements

We appreciate all the people (administrators, coaches and players) who helped us to finish this work.

References

1. BASHKIN, I.M., U.V. MAKAROVA, 2012. Okremi problemy fizychnoji reabilitaciji na suchasnomu etapi [certain problems of physical rehabilitation at present]. *Proceedings of the Aktualjni pytannja formuvannja zdorovogho sposobu zhyttja ta vykorystannja ozdorovchykh tekhnologhij : materialy mizhnarodnoji naukovo-praktychnoji konferenciji* (Ukraine, Kherson, September 6–8, 2012), Kherson, pp.3–8.
2. BENZIDANE, H., D. MOKRANI & M. ZERF, 2017. The impact of weighted basketball balls in improving certain physical performances via wheelchair basketball players. In: *Turkish Journal of Kinesiology*. **3**(2), pp.17-21.
3. BOUZAKARIA, T., D. A. SEKARNA, M. AMROUCHE & K. LABANE, 2018. Weight Training for Speed and its Impact on the Skillful Performance of Basketball Players. In: *J Phy Fit Treatment & Sports*. **5**(2), pp.1-5.
4. BOZON, S. & Y. VANLANDEWIJCK, 2007. *Perspektyvy : vydy Sportu dlia Osib z obmezhenyimi mozhlyvostiamy*. Berlin: Mizhnarodna Rada zi Sportyvnoji Nauky i fizychnoho vehovannia (ICSSPE). tom 7.
5. CHAHINAZ, E. B, 1994. *Impact of sport activities programme amended some elements of fitness and personal social adaptation of disabled children*. Faculty of physical education for girls. Cairo.
6. COUTTS, K. D., 1990. Kinematics of sport wheelchair propulsion. In: *Journal of Rehabil Res Dev*. **27**, pp.21–26.
7. De GROOT, S., I. J. BALVERS., S. M. KOUENHOVEN & T. W. JANSSEN, 2012. Validity and reliability of tests determining performance-related components of wheelchair basketball. In: *Journal of Sports Sci*. **30**(9), pp879-887.
8. DePAUW, K. P. & S. GAVRON, 1995. *Disability and sport*. Champaign, IL: Human Kinetics.

9. DEWELL, R, 2001. Path Theory: Wheelchair Tripping. In: *Basketball News*. **15**(1), pp.27–28.
10. FILORAMO BAL L, 2007. *Disabilità e Sport*. Celid, Torino.
11. GIACOBBI, J. R., M. STANCIL., B. HARDIN & L. BRYANT, 2008. Physical activity and quality of life experienced by highly active individuals with physical disabilities. In: *Adapted Physical Activity Quarterly*. **25**(3), pp.189-207.
12. GOOSEY-TOLFREY, V., 2010. *Wheelchair Sport*. Champaign, IL: Human Kinetics
13. GOOSEY-TOLFREY, V., D, BUTTERWORTH. C, MORRISS, 2002. Free Throw Shooting Technique of Male Wheelchair Basketball Players. In: *Adapted Physical Activity Quarterly*. **19** (2), pp.238–250.
14. GREEN, S., 1999. *Specific Exercise Programs In D.A. Apple (ed.), Physical Fitness: A Guide for Individuals with Spinal Cord Injury*. (pp 45-96). Department of Veterans Affairs-Veteran Health Administration. retrieved, from <http://www.vard.org/mono/sci/scigreen.html>
15. HUNTER, G. R., J. HILYER & M. A. FOSTER, 1993. Changes in fitness during 4 years of intercollegiate basketball. In: *J Strength Cond Res*. **7**, pp. 26-29.
16. HYU-BIN, M., P. SEUNG-JAE., K. AI-CHAN., J. JEE-HUN, 2013. Characteristics of upper limb muscular strength in male wheelchair tennis players. In: *Journal of Exercise Rehabilitation*. **9**(3), pp.375-380.
17. KNECHTLE, B., W. KOPFLI, 2001. Treadmill exercise testing with increasing inclination as exercise protocol for wheelchair athletes. In: *Spinal Cord*. **39**, pp. 633–636.
18. KOSE, B., 2018. Does the weight of basketball shoes affect speed and jumping performance? In: *physical education and students*. **22**(6), pp.316–319.
19. KRAVCHENKO, A. & M. CHKHAJLO, 2008. Aktualjni problemy korekciji fizychnogho stanu futbolistiv iz vadamy zoru iz zastosuvannjam pryrodnykh zasobiv [Topical problems of physical condition correction of visually impaired football players by means of natural remedies]. *Fizychnye vykhovannja, sport i kuljtura zdorov'ja u suchasnomu suspiljstvi : zb. nauk. pr. [Physical education, sport and health culture in modern society: collection of scholarly papers]*. Luts'k, t. 3, pp.69 -74.
20. MALONE L. N., 2000. Expanding the Dichotomous Outcome in Wheelchair Basketball Shooting of Elite Male Players. Adapted. In: *Physical Activity Quarterly*. **17**, pp.437-449.
21. OWEN, E., 1982. *Playing and Coaching Basketball*. Champaign: University of Illinois Press.

22. OZMEN, T., B. YUKTASIR., N.U. YILDIRIM., B. YALCIN & M. E. WILLEMS, 2014. Explosive strength training improves speed and agility in wheelchair basketball athletes. In: *Brazilian Journal of Sports Medicine*. **20**(2), pp.97-100.
23. RUDENKO R., A. MAHLIOVANY, O, SHYYAN & T. PRYSTUPA, 2015. Physical rehabilitation and thermoregulatory processes in athletes with disabilities. In: *Journal of Physical Education and Sport*. **15**(4), pp.730 – 735.
24. VANLANDEWIJCK, Y. C., D. J. DALY & D. M. THEISEN, 1999. Field test evaluation of aerobic, anaerobic, and wheelchair basketball skill performances. In: *Int J Sports Med*. **20**(8), pp.548-554.
25. WANG, Y. T., S. CHEN, W. LIMROONGREUNGRAT & L. S. CHANGE, 2005. Contributions of selected fundamental factors to wheelchair basketball performance. In: *Med Sci Sports Exerc*. **37**(1), p.130.
<http://dx.doi.org/10.1249/01.mss.0000150076.36706.b2>
26. WELLS, C. L., S. P. HOOKER, 1990. The spinal injured athlete. In: *Adapted Physical Activity Quarterly*. **7**(3), pp.265-285.
27. YANCI, J., C. S. GRANADOS, M. OTERO, A. BADIOLA, J. OLASAGASTI, I. BIDAURRAZAGA-LETONA, A. ITURRICASTILLO & S. M. GIL, 2015. Agility, strength and endurance capacity in wheelchair basketball players. In: *Biology of Sport*. **32**, pp.71-78.
28. YESSIS, M., 2003. *Explosive Basketball Training*. Roché, USA.
29. YUN-A, SHIN, WON-HO CHOI, 2018. Effects of weighted baseball throwing during warm-up on ball velocity and upper extremity muscle activation in baseball pitchers. In: *Journal of Exercise Rehabilitation*. **14**(3), pp.436-444.