International Journal of Law, Education, Social and Sports Studies (IJLESS)
A Peer Reviewed (Refereed) International Research Journal
Homepage:www.ijless.kypublications.com
Vol. 2. Supplementary issue 3.2015 (October)

Category: Science of Sports Training

IMPACT OF VOLLEYBALL SPECIFIC PLYOMETRIC TRAINING ON ARM AND LEG EXPLOSIVE POWER OF MALE VOLLEYBALL PLAYERS

SHAIK MANNAN[1], Dr. P. JOHNSON[2], N.VERENDRA[3]
[1]PhD Scholar, University College of Physical Education and Sports Sciences, Acharya Nagarjuna University, Guntur, Andhra Pradesh.
[2]Assistant Professor, University College of Physical Education and Sports Sciences, Acharya Nagarjuna University, Guntur, Andhra Pradesh.
[3]Research scholar, University College of Physical Education and Sports Sciences, Acharya Nagarjuna University, Guntur, Andhra Pradesh.

ABSTRACT

The purpose of the study was to determine whether twelve weeks of volleyball specific plyometric training can improve arm and leg explosive power of male volleyball players. To achieve the purpose, 30 male volleyball players were selected randomly from Telangana State Social Welfare Residential Junior College, Armoor, Nizamabad, Telangana. The selected subjects were assigned into 2 groups: control group (n=15) and plyometric training group (n=15). The selected subjects were tested before and after twelve weeks of plyometric training on arm and leg explosive power. The results of the study showed significant improvement on arm explosive power (F = 38.89, p = 0.000) and leg explosive power (F = 34.13, p = 0.000). It is concluded that twelve weeks of volleyball specific plyometric training showed 13.51% of improvement in arm explosive power and 9.79% in leg explosive power. Thereby, it would significantly improve their jumping ability and hitting velocity of the ball while playing volleyball.

Keywords: Volleyball, explosive power, arm, leg, vertical jump, medicine ball throw

INTRODUCTION

Volleyball is one of the world popular game, which is played either in indoor or outdoor around the world. The game volleyball was invented by William G. Morgan in the year 1985. He invented this game for players to play during pastime preferably in indoor. Since then this game has taken greater modification in rule which accelerated the intensity of the game. In order to sustain the present demand in the game players anthropometric, physical fitness and physiological capacities are highly developed through systematic and scientific methods employed in training.

Volleyball players require greater speed, strength, explosive power, agility, flexibility and endurance to excel. This game is like other game requires both anaerobic as well as aerobic fitness but greater emphasis is placed on anaerobic fitness. Here the players perform jumps to spike, block and serve. This clearly shows that volleyball players require greater explosive power in extremities to perform jump and spike at greater velocity. Earlier it has been showed that power is combination of strength and speed. Therefore, volleyball players require strength in upper and lower extremities (5, 8, 10). The strength in the limbs of the young players is important along with specific technical skills (8).

It is also noted that actions in volleyball possesses eccentric and concentric contraction of muscle while performing all motor actions (13). The stretching and shortening cycles are characteristic of plyometric training. The elastic characteristics of muscles and the reflex function have a significant influence on the

stretching of muscles. The muscle stretching reflex is included in the SSC (stretch shortening cycle). For a high quality eccentric-concentric contraction, three important conditions have to be satisfied: the timely activation of the musculature just prior to the eccentric contraction, the short duration of the eccentric contraction and the instant shift from the stretching phase to the shortening phase (7). Earlier studies have proved that plyometric training leads to better adaptations of the CNS and a greater increase in strength and jumping ability (6, 11).

The scenario is to train the players more specific to game. The training which is designed today should possess movements and skills performed during the game. This has greater advantage by improving skill and fitness of the players. Earlier it has been proved that sports specific endurance circuit training displayed significant improvement in sprinting performance and leg explosive power of high school male basketball players during their competitive season (3). The endurance training had not affected sprinting performance and leg explosive power but earlier studies showed that either strength parameters get affected or remain unaltered. Here, we intend to improve the arm and leg explosive power through volleyball specific plyometric training on male volleyball players.

Methods

Subjects and Variables

n this study 30 male volleyball players were selected randomly from Telangana State Social Welfare Residential Junior College, Armoor, Nizamabad, Telangana. The selected subjects were assigned into 2 groups: control group (n=15) and plyometric training group (n=15). All subjects were instructed to refrain from participation in any other form of training during the training period that might influence their arm and leg explosive power. The criterion variable selected in this study is arm explosive power measured by medicine ball (5 kg) throw test and leg explosive power through vertical jump test. Pre and post agility was measured on the field.

Plyometric training

The designed protocol of plyometric was performed three times in a week for twelve weeks with the training volume ranged from 80 foot contacts for first two weeks and subsequently 10 foot contacts were increased and finished with 140 foot contacts per session. The volume and intensity of the exercises increased for twelve weeks. The cone height is 40cm and bench height is 40cm was used in this study.

Collection of data

Volleyball players were selected and tested at two occasions. The selected subjects were tested on arm and leg explosive power before and after twelve weeks of plyometric training.

Statistical Technique

Pre and post test data were collected before and after 8 weeks of training. The collected data was analysed using analysis of covariance (ANCOVA). Paired t test was applied to know the difference between the pre and post test difference within the groups. All the statistical tests were calculated using the statistical package for the social science (SPSS) for windows (Version 17).

Results

Arm explosive power

It is clearly from the study that pre test on arm explosive power showed no significant difference ($F = 2.541$, $p = 0.122$). However, post test ($F = 28.78$, $p = 0.000$) and adjusted post test ($F = 38.89$, $p = 0.000$) mean showed significant difference among the groups on arm explosive power. The plyometric group displayed 13.51% of improvement in arm explosive power. This also clearly show that due to twelve weeks of volleyball specific plyometric training significantly improved arm explosive power ($t = 6.64$, $p < 0.05$).

Leg explosive power

It also clearly show that pre test on leg explosive power showed no significant difference ($F = 0.003$, p

International Journal of Law, Education, Social and Sports Studies (IJLESS)
A Peer Reviewed (Refereed) International Research Journal
Homepage:www.ijless.kypublications.com
Vol. 2. Supplementary issue 3.2015 (October)

= 0.958). However, post test (F = 12.56, p = 0.001) and adjusted post test (F = 34.13, p = 0.000) mean showed significant difference among the groups on leg explosive power. The plyometric group displayed 9.79% of improvement in leg explosive power. This also clearly show that due to twelve weeks of volleyball specific plyometric training significantly improved leg explosive power (t = 8.384, $p < 0.05$).

Discussion on findings

The present research aims to investigate the effect of 12-weeks of volleyball specific plyometric training on arm and leg explosive power of male volleyball players. In the present study 13.51% and 9.79% of improvement was noticed in plyometric training group on arm and leg explosive power. Medicine ball throw for distance measures the explosive power of the arm. In volleyball upper limb muscle strength is widely used and which show differentiation between the results of the team (9). Pereira and his colleagues (12) found that combined plyometrics and ball throwing program for eight weeks on the upper and lower body can induce significant adaptation in young female players performance in young female volleyball players. The changes in arm explosive power are presented in Figure 1.

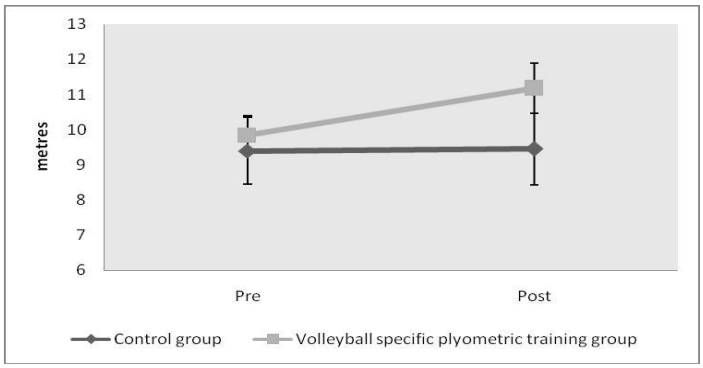

Figure 1: Changes in arm explosive power

In the present study it is noted that leg explosive power also improved as a result of volleyball specific plyometric training. Increase in elastic strength had an effect on the increase in the ability for the high jump, as well as for the depth jump. Similar results were obtained in a study carried out by Chu (4) and Asadi & Arazi (1).

Earlier it has been proved that sprinting performance show positive correlation with agility and negative correlation with explosive power among handball players (2). Therefore, the leg explosive power improvement will display significant changes in sprinting ability of volleyball players. It is clear that plyometric training show improved performance in arm and leg explosive power tests either because of better motor recruitment or neural adaptations. The changes in leg explosive power are presented in Figure 2.

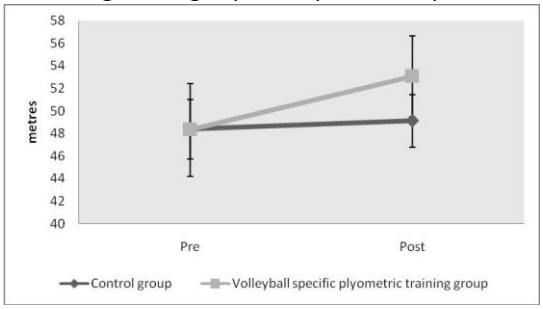

Figure 2:Changes in leg explosive power

Conclusion

It is concluded that twelve weeks of volleyball specific plyometric training showed 13.51% of improvement in arm explosive power and 9.79% in leg explosive power. Thereby, it would significantly improve their jumping ability and hitting velocity of the ball while playing volleyball. Volleyball specific plyometric training may show multidimensional improvement in volleyball players.

References

[1]. Asadi, A., and Arazi, H. Effects of high-intensity plyometric training on dynamic balance, agility, vertical jump and sprint performance in young male basketball players. *Journal of Sport and Health Research*, 2012, 4(1): 35-44.

[2]. Chittibabu, B. Estimation of relationship between sprinting performance with agility and explosive power of mal handball players. *International journal of current research in life science*, 2014, 3(8): 056-058.

[3]. Chittibabu, B., Akilan, N. Effect of sports specific endurance circuit training on sprinting performance and leg explosive power of high school male basketball players during competitive. *Global Journal for Research Analysis*, 2014, 3(12): 1-2.

[4]. Chu, D.A. (1991). *Jumping into plyometrics*. Champaign, IL: "Leisure Press".

[5]. Forthomme, B., Croisier, J.L., Ciccarone, G., Crielaard, J., Cloes, M. Factors correlated with volleyball spike velocity. *Am J Sports Med*, 2005; 33:1513–9.

[6]. Harris, G.R., Stone, M.H., O'Bryan, H., Proulx, C.M., & Johnson, R. Short term performance effects of high speed, high force and combined weight training.

[7]. *Journal of Strength and Conditioning Research,* 1999, 13: 14-20.

[8]. Komi, P.W., & Gollhofer, A. Stretch reflex can have an important role in force enhancement during SSC exercise. *Journal of Applied Biomechanics*, 1997, 13, 451-460.

[9]. Marques, M.C., Tillaar, R., Vescovi, J.D., Gonzalez-Badillo, J.J. Changes in strength and power performance in elite senior female professional volleyball players during the in-season: a case study. *J Strength Cond Res*, 2008, 22: 1147– 55.

[10]. Marques, M.C., van den Tillaar, R., Gabbett, T., Reis, V.M., González-Badillo, J.J. Physical fitness qualities of professional volleyball players: determination of positional differences. *J Strength Cond Res*, 2009; 23:1106–11.

[11]. Noyes, F.R., Barber-Westin, S.D., Smith, S.T., Campbell, T. A training program to improve neuromuscular indices in female high school volleyball players. *J Strength Cond Res*, 2011, 25: 2151–60.

[12]. Paul, E.L., Jeffrey, A.P., Mathew, W.H., John, P.T., Michael, J.C., & Robert, H.L. Effect of Plyometric Training and Recovery on Vertical Jump Performance and Anaerobic Power. *Journal of Strength and Conditioning Research*, 2003, 17(4), 704-709.