Research Paper Physical Education

Effect of Small-Sided Handball Game on Body Composition And Aerobic Capacity of Male Handball Players

Dr. B. Chittibabu | Assistant Professor, Department of Physical Education and Sports Sciences, Annamalai University, Chidambaram, Tamilnadu, India

ABSTRACT

The aim of our study is to assess the effect of small-sided handball game on body composition and aerobic capacity of male handball players. Sixteen (16) handball players were selected and randomly classifieds into two groups namely small-sided handball game (SSHG = 8) and control group (CON = 8). Sixteen handball players were tested before training, after three weeks of training and after six weeks of training. The body composition was measured through skinfold measurements and aerobic capacity was measured by Yo-Yo intermittent recovery test level II. The SSHG group performed 4 × 4 min small sided game at an intensity of 90-95% of heart rate maximum (HRmax), separated by 4 minutes of active recovery during which handball passing drill was performed at 60-65% of HRmax. To assess the training effect 2 × 3 repeated measure ANOVA on last factor was performed. When interaction is significant simple effect was calculated and followed by Scheffe S post hoc test. The result of our study showed that eight weeks of SSHG training failed to show changes in percent body fat ($F = 0.835$, $p = 0.445$) and lean body mass ($F = 2.763$, $p = 0.080$). However, aerobic capacity showed a significant improvement ($F = 51.36$, $p = 0.000$) in handball players. The training intervention showed aerobic power 4.75% of improvement after three weeks and 8.83% after six weeks of handball specific aerobic training. We concluded that small sided handball training programs might be appropriate enough to improve aerobic power but body composition remained unchanged in handball players in short training duration.

KEYWORDS Small-sided game, percent body fat, lean body mass, aerobic capacity

Introduction

Handball is a team sports characterised by repeated sprint bouts of high intensity of short duration with partial rest. Handball players require greater speed, strength, power, endurance, agility and flexibility to excel in competition. However, the players have to perform intermittent sprint repeatedly without getting fatigue for sixty minute duration, thereby endurance capability plays a vital role during a handball match. The importance of physique and body composition of handball players plays a vital role in performance. However, it is a primary concern in conditioning programs throughout a season at all levels of competition. The inherent physical stress of practice sessions and competition during a season may modulate body composition (Ekblom 1986).

Today, players are exposed more to game based training in particular, game with reduced number of players, field size etc. The reviews clearly show that small sided games are advantages such as game specific movements, technical training, possible tactical improvements and improve physiological adaptations. This type of training might increase the efficacy of training and even reduce the total training time because of the multi-functionality. This type of games clearly shows the improvement in aerobic fitness, anaerobic endurance and agility in rugby, basketball, volleyball and handball. These small sided games were administered for more than six weeks. The impact of handball specific aerobic training for four and eight weeks is not investigated. Hence the purpose of this study was to assess the effect of small-sided handball game training on body composition and aerobic capacity of male handball players.

Methodology

Subjects

Sixteen (16) university level handball players were selected from Department of Physical Education and Sports Sciences, Annamalai University, Chidambaram, Tamilnadu, India. The selected subjects represented Annamalai University in Indian University Competition. The selected handball players have the average (±SD) age of 22.12 ± 3.22 years; height 174.50 ± 7.83 cm and weight 65.62 ± 7.79 kg. These players have a minimum of eight years of playing experience and gave willingness to take part in the study.

Study design

The subjects were randomly assigned into two groups. Group 1 (n = 8) performed small sided handball game while Group 2 (n=8) served as control group. Testing of each group was performed on three occasions first before administration of training as pre test, after four weeks of training as mid test and after eight weeks of training as post test.

Variable and test

Body composition

Measuring percentage of body fat by taking the 'skinfold' thickness at selected points on the body with a skinfold calipers. The skinfold measurements were taken from three to nine anatomical sites, that too only on the right side of the body. In this study, four sites (abdominal, triceps, thigh and suprailliac) as proposed by Jackson and Pollock (1985) was considered. The tester pinched the skin at the appropriate site to raise a double layer of skin and the underlying adipose tissue, but not the muscle. The calliper was then applied 1 cm below and at right angles to the pinch, and a reading in millimetres (mm) taken two seconds later. The mean of two measurements was taken. Whenever the two measurements differed greatly, a third was done, and then the median value was taken.

Formula to Calculate

Percentage of body fat was calculated using the following equation of Jackson and Pollock (1985):

Percent body fat = {(0.29288 x sum of skinfolds) – (0.0005 x square of the sum of skinfolds) + (0.15845 x age) – 5.76377}

Lean body mass = Body mass – Fat weight

Yo-Yo intermittent recovery test level II

The aerobic capacity of handball players was measured by Yo-Yo intermittent recovery test level II. The players were administered with ten minutes of warming up. Then players were asked to line up in front of twenty meter marked area with cones. The tester instructs the subjects to run half way and return to the starting point when the sound signal produced from music player. The tester keeps recording the distance

covered by the players. We used formula for estimation of VO_2 max = distance in meter × 0.0136 + 45.3 (Bangsbo *et al.*, 2008).

Handball specific aerobic training
Handball specific aerobic training will be performed for 3 days per week for six weeks. They perform 4 repetitions of high intensity game with duration of 4 minutes with intensity of 90 to 95% of HRmax and 4 minutes of active recovery with intensity of 60 to 65% of HRmax they performed handball passing drills. The players were strapped with polar heart rate monitor and exercise heart rate were fixed and if they perform below or above the fixed range it produces the beep sound alert the players.

Statistical technique
A two-way repeated measure ANOVA with last factor repeated was applied to examine the difference in body composition and aerobic capacity between groups and testing conditions. When interaction is significant simple effect was applied and Scheffe S post hoc test was applied to the difference between different testing conditions. All the statistical tests were calculated using the statistical package for the social science (SPSS) for windows (Version 16). The level of statistical significance was set at $p<0.05$.

Results
The two way repeated measures on last factor was conducted which examined the effect of handball specific aerobic training for four and eight weeks duration on body composition and aerobic capacity.

Body composition
There was no significant interaction effect between the groups and testing conditions on percent body fat ($F = 0.835$, $p = 0.445$) and lean body mass ($F = 2.763$, $p = 0.080$). This clearly show that eight weeks of small-sided game showed no impact on body composition of handball players.

Aerobic capacity
There was a significant interaction between the groups and testing conditions on aerobic capacity ($F = 51.36$, $p = 0.000$). The simple effect analysis revealed that at mid test ($F = 10.83$, $p = 0.005$) and post test ($F = 36.16$, $p = 0.000$) significant difference between the small-sided handball game group and control group. However, small-sided handball game group showed significant difference at different testing conditions ($F = 19.62$, $p = 0.000$) but there was no difference on control group. Since small-sided handball game group showed significant difference at different testing conditions, Scheffe S post hoc test was applied. This clearly show that aerobic capacity improved 4.75% after four weeks of training and 8.83% of improvement after eight weeks of handball specific aerobic training in male handball players.

Discussion
In the present study the results have elicited no changes in the body composition of handball players due to handball specific aerobic training. The percent body fat level of the handball players were to the optimal level and tend to reduce but statistically significant difference was not elicited. Earlier studies had proved that high intensity endurance training significantly reduce the percent body fat level or increased lean body mass. However, the duration of the training and training intensity was not sufficient enough to bring desirable changes in body composition. The visceral fat alterations were not elicited as a result no change is elicited in percent body fat and lean body mass (Conway *et al*. 1995; Seidell *et al*. 1987; Lemieux *et al*. 1994).

The aerobic power of handball players improved significantly after four and eight weeks of high intensity game. Earlier, Chittibabu (2013) in his study showed that handball specific repeated sprint training for eight weeks is more effective in increasing aerobic capacity of men handball players. The training load adopted in repeated – sprint training with game specific which resulted in 11.79% of changes in aerobic capacity, however, the improvement in the present study is less. In the present study we implemented skill based conditioning games which constitutes both handball specific skills and fitness. The high intensity game and active recovery facilitate to improve aerobic capacity of male handball players. Similarly, Helgerud *et al*. (2001) proved that aerobic power has been shown to improve in soccer players. The changes in aerobic capacity due to handball specific aerobic training may result in several changes in cardiovascular function, including increased maximal cardiac output, increased stroke volume, and reduced heart rate at rest and during submaximal exercise. The most significant change in cardiovascular function with long endurance training is the increase in maximal cardiac output, resulting primarily from improved stroke volume (Baechle and Earle, 2008). It is concluded that the game based training failed to show alterations in body composition but it significantly improves both aerobic capacity in male handball players. This improvement might contribute to match performance.

REFERENCES

1. Baechle, T.R. and Earle, R.W. 2008. Essentials of Strength Training and Conditioning (3rd ed.) Champaign, IL: Human Kinetics. pp. 127–128. | | 2. Bangsbo, J., Iaia, F.M. and Krustrup, P. 2008. The Yo-Yo intermittent recovery test: a useful tool for evaluation of physical performance in intermittent sports, Sports Medicine., 38 (1) : 37-51. | | 3. Chittibabu, B. 2013. Effect of handball specific repeated – sprint training on aerobic capacity of male handball players. International Journal of Physical Education, Fitness and Sports., 2(4): 4-7. | | 4. Conway, J.M., Yanovski, S.Z., Avila, N.A., Hubbard, V.S. 1995. Visceral adipose tissue difference in black and white women. Am J Clin Nutr., 61: 765–71. | | 5. Coutts, A.J., Hill-Haas, S., Moreira, A. and Aoki, M.S. 2010. Use of skill-based games in fitness development for team sports. Brazilian Journal of Sport and Exercise Research., 1(2): 108-111. | | 6. Ekblom, B. 1986. Applied physiology of soccer. Sports Med., 3: 50-60. | | 7. Helgerud, J.L., Engen, C., Wisloff, U. and Hoff, J. 2001. Aerobic endurance training improves soccer performance. Med. Sci. Sports Exerc., 33(11): 1925-1931. | | 8. Jackson, A.S., Pollock, M. (1985). Practical assessment of body composition. Physician Sport Med, 13: 76-90. | | 9. Lemieux, S., Després, J.P., Moorjani, S., et al. 1994. Are gender differences in cardiovascular disease risk factors explained by the level of visceral adipose tissue? Diabetologia., 37: 757–64. | | 10. Seidell, J.C., Deurenberg, P., Hautvast, J.G.A.J. 1987. Obesity and fat distribution in relation to health—current insights and recommendations. World Rev Nutr Diet., 50: 57–91. |