ISSN: 2349 - 4891

International
Journal of Recent Research and Applied Studies
(Multidisciplinary Open Access Refereed e-Journal)

Effect of Balance Exercise Training Program on Dynamic Balance among the Male Handball Players at School level

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Received 12th November 2016, Accepted 5th December 2016

Abstract

Balance is one among the key factor in determining the success of sports. It refers the ability of an individual to stabilize the posture both in static and dynamic movements. Being the motor fitness component, balance is to be trained among the handball players along with the fitness parameters as the movements of this game require the ability of balance. With this the present study is aimed at to study the effect of balance exercise training program on the dynamic balance among the male handball players at school level. For which as subjects, totally 36 male handball players studying in schools and participated in the inter-school level tournament are selected as subjects in the age group of 12 to 15. As an experimental design the pre-post experiment design is employed in this study. From them, by using the random sampling method, 24 subjects are selected finally for this study. They are divided into two groups equally and named as experimental and control groups. Subjects of both groups are tested on the dynamic balance using the modified bass balance test. It is considered as a pre-test score. Following this, the subjects of the experimental group are treated with the balance exercise training program for the twelve weeks in alternate days. After completion of the treatment period, subjects of both the groups are tested on the dynamic balance as such in the case of pre-test and considered as a post test score. The collected data on the dynamic balance are treated by paired t- test analysis of covariance so as to study the individualized effects and comparative effect. Results of the study are confirming the balance exercise training program on the dynamic balance among the handball players positively.

Keywords: Balance, Dynamic balance, Agility, Visual sense, Proprioceptive, Stabilization, Mobilization, Posture.

Introduction

In nature, balance refers the ability of a player to maintain the body's center of gravity within its base of support. Balance is a movement skill that enhances the technique, and a conditioning element. As a function of the nervous system, balance is directly influenced by the five senses. A sixth sense proprioception in the muscles, bones, hands, feet and the connective tissues alert the body when balance is threatened. The body's balance centers the eyes, ears and feet works together to the sense imbalance and help in the correct posture. Earlier studies are also emphasizing the efficacy of the balance ability of players is the result of the ability of the player who are paying attention to the proprioceptive and visual clues (Ashton et al.2004). The role of the sensory systems namely visual, auditory and tactile is differing in terms of its need in the physical movements.

Based on the movements, balance is generally segmented into static and dynamic. In static balance, the player has to sustain the body in static equilibrium or within its base of support whereas in the dynamic balance, the player has to be more challenging because it requires the ability to maintain equilibrium during a transition from a dynamic to a static state. Both static and dynamic balance need the integration of senses of visual, vestibular, and proprioceptive inputs so as to produce an efferent response to control the body within its base of support. Olmsted et al.(2002), RossSE, Guskiewicz (2004).

In sport, many people believe that participating in sports is the best form of sports conditioning. Participating in sport provides good conditioning, which in turn an individual may be proficient at sport technique, focus on rhythm, flow of movement and the surrounding aesthetics. But participation in sport without a technical understanding can cause out of balance. Hence improving the ability of balance, one can also improve the sports performance and skills. Moreover balance is the prerequisite for an individual not only to perform in sport but also in their day to day life activities (Chiang, Chiang, & Shiang, 2000). This conceptual theme has been accorded by Louis Stack. In his opinion, the need of balance has stated that while strength and cardio training are critical aspects of the conditioning, balance is the foundation of good health, and everyone can improve their balance, regardless of ability. In fact, some researchers suggest that having the ability of

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balance one can spend less amount of time to increase the strength.

In handball, the major fundamental skills are passing, throwing and shooting. A handball player should have the ability of speed, explosive power, flexibility and throwing velocity and represent the physical activities as they closely associated with the upper extremity passing, shooting and dribbling skills, in which the execution of these skills in the game situation either may be in the stationary or moving. The successful execution of these skills demands the postural control. Postural control is being the physical quality an acquired from the physical training, it needs specific training such as sensory motor based since its ability is influenced remarkably by the senses of visual, auditory and tactile.

Physical training can improve sensory motor performance and postural control (Anderson K,Behm DG and Vuillerme,2001). According to Louis Stack though the strength training and endurance training are the major aspects of conditioning, balance is the foundation of good health, and everyone should concentrate on their ability of balance. Fitness consultants are suggested that having the balance can easily improve the physical fitness components. Balance conditioning is a way to train the body to make better use of the strength," Training for stabilization, proprioception and balance will make the individual to be free from incidence of sport injury. Balance training facilitates the body awareness about the relationship of mass (hips) over the base of support (distance created between the feet or over one foot). While playing sports, this is a difficult thing to sense, but in a controlled training environment, these "feelings" can be introduced to athletes. Balance awareness becomes an innate and automatic skill.

Based on the need of balance training in sports, with specific objectives the present study has been taken to study the effect of balance exercise training in improving the dynamic balance among the handball players specifically at early ages. The specific objectives are: to study the effect of balance exercise training on dynamic balance, and to study the status of dynamic balance among the players at early ages. The means and methods employed in this study are as follows.

Methodology

To achieve the objectives framed in the present study, the means and methods used in the selection of subjects, experiment design, selection of variables, experiment design, test used to measure the variable, balance exercise training collection of data and statistical analysis of data are described as follows. In the present study as subjects, totally 36 handball players participating the inter school level tournament were selected. Among them, 24 subjects were randomly selected and the players were given consent to serve as subjects for the present study. The age of the selected subjects were in the range of 12 to 15 and hailed from various socio economic strata. In handball, to successfully complete the skills of throwing, passing and scoring the ball, the player has to stabilize the body posture which is the ability of dynamic balance. Thus the ability of dynamic balance is selected as a variable for the present study. As the experimental design, pre-post random group experiment design was chosen. The selected subjects were (N=24) equally divided into two groups namely experimental (N=12) and control (N=12). Using a standardized test (Modified Base Balance Test) the selected subjects of both the groups were measured on variables of dynamic balance to study the level before implicating the intervention. It was considered as the pre- test score for the present study. The subjects of experimental group were treated with specifically designed Balance Exercises Training Program (BETP) for twelve weeks. The balance exercises were given to the subjects for about 45 minutes in alternate days. Following the balance exercises training, the subjects of the experimental group were practiced with their own training schedule so as to develop the skill performance and performance related parameters. The subjects of control group were also the players who were practiced the regular training schedule without any specific training related to develop the ability of balance.

Balance Exercise training Program

Balance exercise training program used in this study was consisted of warm-up exercise for 5-7 minutes , balance exercise training for about 30 to 35 minutes, and cool-down exercise for about 5 to 7 minutes. Thus the balance exercise training program for the subjects of experimental group was treated for 45 to 50 minutes. Balance exercise training program basically emphasize the value of physical and motor fitness that are essential for the ability of balance. In such a way in the preparatory phase the balance exercises includes the cardio respiratory, strengthening, muscles and stabilizing the joints. Balance training program was composed of the exercises performed by the muscle stretch exercises around the joints and the muscle resistance exercises around the joints. These are the exercises mainly would develop the static balance of the subjects. Static balance is very essential and the pre requisite for dynamic balance. In addition to these exercises, to develop the dynamic balance of the subjects the balance exercises training group was imparted in the activities that require coordination, agility or quick footwork, and movements that challenge the normal range of motion. Thus the specifically designed balance exercise training program was administered to the subjects of the experimental group in addition to their regular training schedule. The subjects of control group were trained only with their regular training schedule without any specific training.

Collection of Data

Before administering the balance exercise training program, the subjects of both the groups were tested on dynamic balance so as to study the level of dynamic balance. It was considered as pre-test score for

the present study. After completion of the training period of twelve weeks, subjects of both the experimental (Balance Exercise Training) and control group were measured on thedynamic balance as such in the case of pre- test. It was considered as the post test score.

Statistical Analysis

The collected data on dynamic balance were treated with the Paired T-test and Analysis of covariance: 1. To study the changes from the baseline to post treatment and 2.To study the comparative effect of balance exercise training between the subjects of experimental and control group. The derived results were tested for the significance at 0.05 level. For the statistical analysis of data, SPSS 20.0 version was used. The results obtained were presented as follows with analysis

Table I. Descriptive statistics of the balance exercise group on dynamic balance

Source	Number of subjects	Mean	Standard Deviation	Standard Error
Control group - Pre test	12.00	64.83	6.12	1.77
Control Group - Post test	12.00	63.00	7.16	2.07
Balance Exercise group-Pre test	12.00	64.42	4.78	1.38
Balance Exercise group-Post test	12.00	73.58	7.00	2.02

Table-1 explains the descriptive statistics on the dynamic balance of players treated with the balance exercise program and control group as follows. The mean and standard deviation of players (N=12) used in the balance exercise group prior to treatment and post treatment are: 64.42 ± 4.78 and 73.58 ± 7.00 respectively. Likewise, in the mean and standard deviation of players (N=12) used in the control group prior to treatment and post treatment are: 64.83 ± 6.12 and 63.00 ± 7.16 respectively. The performance of the balance exercise training and control group on dynamic balance is displayed in the fig.1.

Figure I. Mean value of pre and post test of balance exercise group and control group on Dynamic balance

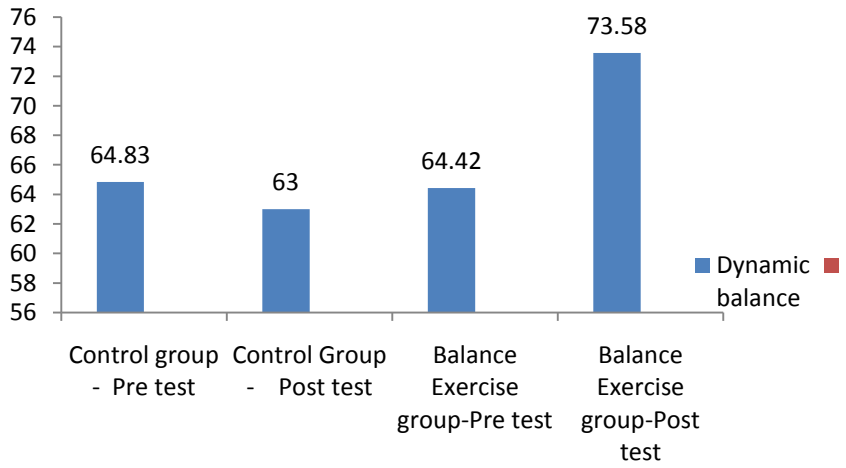


Table II. Testing the significance of mean difference from the pre- test to post test on the dynamic balance of the Balance Exercise group and Control group

Source	Mean Difference	Std. Deviation	Std. Error Mean	t-ratio	df	Sig.
Control Group pre - post	1.83	3.56	1.03	1.78	11.00	0.10
Balance Exercise Program pre - post	9.17	5.37	1.55	5.91 *	11.00	0.00

* Significant at 0.05 level

Table II explains that the results derived from the paired t-test to test the individualized effect of balance exercise program and control group on the dynamic balance. The obtained t-value (5.91) for balance exercise group is found to be significant at 0.05 level. From the results derived, it is inferred that the changes occurred from the pre-test to post test on dynamic balance is statistically significant and the balance exercise program used in the present study is the significant source to develop the dynamic balance for the handball players. Further in testing the individualized effect of Control group, the obtained t-value (1.78) is found to be not significant at 0.05 level and led to infer the changes from the pre-test to post test on the dynamic balance of the player pertain to control group is statistically significant.

Table III. Analysis of variance for the pre -test and post - test means on the dynamic balance

Conditions	Source	Sum of Squares	DF	Mean Square	F	Sig.
Pre test	Between Groups	1.04	1.00	1.04	0.03	0.85
	Within Groups	662.58	22.00	30.12		
Post test	Between Groups	672.04	1.00	672.04	13.41*	0.00
	Within Groups	1102.92	22.00	50.13		

* Significant at 0.05 level-Table value:4.30

Table III reveals that the f-values for pre-test (0.03) and post -test 13.41. To be significant at 0.05 level for df 1, 22, the required critical value is 4.30. The obtained f-value 0.03 is found to be not significant at 0.05 level as it fails to reach the required critical value (4.30) whereas the observed f-value for the post- test (13.41) is found to significant at 0.05 level as it exceeds the required critical value. From the results, it is inferred that the f-value for the pre-test (0.03) confirms the success of the random assignment of subjects to the experimental and control groups. Besides, when studying the f-value for the post test (13.41) which confirm the significance of mean difference on the dynamic balance.

Table IV. Analysis of variance for adjusted post–test means on the dynamic balance

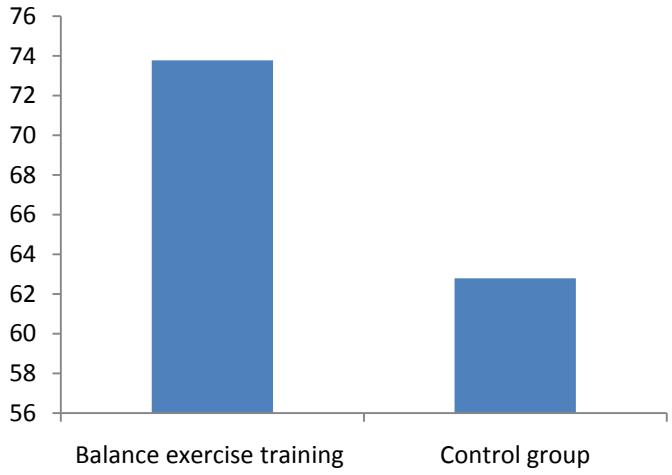
Group	Adjusted mean	Source	Sum of Squares	df	Mean Square	F	Sig.
Balance exercise training group	73.78	Between Groups	724.16	1.00	724.16	33.26 *	0.00
Control group	62.79	Within Groups	457.22	21.00	21.77		

* Significant at 0.05 level-Table value:4.32

Table IV reveals that the adjusted posttest means on dynamic balance and f-value for the analysis of covariance. The adjusted post-test mean on dynamic balance for the balance exercise group and control group are 73.78 and 62.79 respectively. The f-value observed from the testing, the adjusted post- test mean is 33.26. To be significant at 0.05 level for DF 1,21, the required critical value is 4.32. The obtained f-value 33.26is found

to be significant at 0.05 level as it exceeds the required critical value is (4.32). From the results, it is inferred that there is a significant mean difference (fig-2) exist between the players of balance exercise group and control group on adjusted post- test means. The obtained result confirms the effect of balance exercise program on the dynamic balance significantly and positively. In the present study, only the two groups are used for the research purpose, post hoc test is not necessary though the mean difference on dynamic balance is found as statistically significant. The derived results are discussed as follows.

Figure I. Adjusted Mean value of balance exercise group and control group on Dynamic balance



Discussion on findings

In the present study, the balance exercise training program was tested on the ability of the dynamic balance among the handball players at School level. The results derived from the paired t-test and analysis of covariance confirms the efficacy of balance exercise training program positively. Results of the paired t-test explained that the changes from the base line to the post treatment on the dynamic balance are statistically significant. The source for the significant changes is as follows. In experimental group, the subjects were trained with the physical exercises that are basically to learn the technical movements related to agility and concentration and also a source to develop the physical and motor fitness. These may be the complimentary effect of the balance exercise training program for the significant changes on the ability of dynamic balance among the handball players pertain to the experimental group. These positive aspects of balance exercise training program were confirmed by the empirical aspects of Suzanne Nottingham (2001). In his study he pointed out that participating in sports though a source to be good conditioning and be proficient in sport without understanding the technical movements like balance can cause "inefficient flailing". The findings of the present study on the dynamic balance are substantiated by Bakhtiari, (2012). In his study he observed that the balance program is the significant source to prevent injuries and increasing balancing abilities of their athletes.

Following this, the source to the dominance of the balance exercise training group on the dynamic balance compared to the control group is discussed with the theoretical and empirical structure as follows. In the balance exercise training group, initially the players were trained with the exercises such as walk forward a few steps and extend one leg forward, they should feel how the center of mass (hips) moves over that leg to balance helps them to acquire the static balance. It makes them to develop an awareness of the body's natural amount of "sway." Sway happens constantly during all the movement, whether static or dynamic. To feel sway, players should stand with their eyes closed, feet in a walking stance. Following this, these physical exercises were used to improve the dynamic balance exercises consist of focusing hand-eye and foot-eye coordination, agility, sprints and other power conditioning. These activities require coordination, agility or quick footwork, and movements that challenge the normal range of motion that are great ways to cross-train for proprioception and dynamic balance.

Factors such as fastactions and changes of directions, may contribute to the concept of balance as well. Besides it, the balance exercises include sensing imbalance, reacting quickly and recovering from the imbalance via subtle physical adjustments. Balance exercises training concomitantly improve the ability of the proprioceptive senses and other senses like visual, auditory and tactile. Lephart, Pincivero, Giraido, and Fu (1997) stated that proprioception system of body as a

particular variation of the sensory system that contains the joint sensation and position of joints. Besides it stressed the ability to recognize the position and movement of joint is important to effectively participate in the activities such as sports.

In such a ways, the balance exercises may be a significant source to the handball players to perform better in the dynamic balance as compared to the players of control group. It was substantiated by the findings of Chiangetal.(2000)from his study on balance ability between non-athletes and judo players that balance training group showed the significant difference in the time of balance than the non-athletes and judo players. In the line of this, the study conducted by Salehzadeh et al.(2011) proved that the effect of 8-week combinational training (strength and plyometric) on the dynamic balance of teenage handball players.

Conclusions

In studying the individualized effect and comparative effect of balance exercise training on dynamic balance, the obtained results confirm the need of the balance exercise training program. In testing the individualized effect, the balance exercise training group, significant changes were observed from the pre- test to post- test on dynamic balance among the subjects treated with the balance exercise training group. Balance exercise training primarily focused on developing the components needed to mobilize and stabilize the body posture which results in strengthening the static balance among the subjects. Following this, keeping the factors and determining the dynamic balance, the specific drills underlie the movements of agile, coordination, perception and reaction employed for the balance exercise training group. Thus the subjects of the balance exercise training group primarily nurture over the static balance and sensory motor system. By this, it is concluded that the complimentary effect of the individual static balance and sensory motor abilities enriches from the specific drills can be a significant source for the individualized effect and comparative effect of the balance exercise training group on the dynamic balance.

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