Effect Of Spirometer and Bosu Ball in Balance and Respiratory Training in Air Rifle Shooter

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Abstract-Background- Breathing exercise play's a crucial role in Posture regulation. By focusing on controlled breathing atheletes can become more aware of their body alignment and engage their core muscles effectively. An incentive spirometer is a tool designed for maintaining volume of air inhaled into Lungs during process of inspiration. Insensitive Spirometers ability to give the visual feedback were as Bosu Ball is considered as controllable safe and effective tool for balance therapy. The unique design and functional versatility of bosu ball make it an individual asset in physical therapy and workout regimens aimed at enhancing an individual's physical well-being. Methodology- This study was conducted in Vedh academy and Target Shooting Olympic academy in Kolhapur. 85 subjects were approached and 71 who met the inclusion and exclusion criteria. They were randomly assigned to control group (Respiratory training with spirometer and breathing exercises) and Experimental group (Respiratory training with Spirometer and balance training with bosuball) using simple random technique. Session was conducted twice a week for 25 to 30 minutes including warm up and cool down. Pre and post assesment was taken. Results- Comparison between both the groups there was significant improvement in Experimental group then in Control group p value -0.03. Conclusion- Respiratory and balance training helps the rifle shooters to improve their performance instead of only Respiratory training.

Keywords- Breathing exercise, Spirometer, Bosu Ball

INTRODUCTION

Air Rifle Shooting, as an Olympic sport, demands a fusion of skill, precision, and unwavering mental focus across its various disciplines. Central to mastering this demanding pursuit is the art of posture regulation, with breathing exercises emerging as a pivotal component in achieving optimal performance. These exercises have become a focal point within the sports science community and among athletes striving for excellence. By systematically honing breathing techniques, athletes can bolster the functionality and efficiency of their respiratory muscles, enhancing both inhalation and exhalation processes. Strengthening these muscles facilitates a more effective exchange of oxygen, thereby amplifying athletic capabilities. With improved oxygen delivery and carbon dioxide removal, athletes can sustain higher intensities for prolonged durations, underscoring the transformative impact of breathing exercises on athletic prowess in Air Rifle Shooting[1]. In competitive shooting, shooters face the daunting challenge of precisely aiming at a target positioned 10 meters away, where the bulls eye, or 10-ring, is a mere 1 millimeter wide. Achieving a perfect score of ten hinges on the bullet making contact with this minuscule ring. However, the intricacies of firearm mechanics come into play as well, as the recoil generated upon firing necessitates careful management. The degree of movement required to control this recoil can significantly influence a shooter's performance, as any deviation from the desired aim can result in missed shots and reduced accuracy. Consequently, mastering techniques to effectively handle recoil becomes imperative for shooters aiming for consistent success in competitive shooting scenarios[2] .

In essence, the incorporation of controlled breathing practices elevates athletes beyond mere physical conditioning, fostering a holistic approach to athleticism. Through mindful breathing, athletes refine their proprioception, honing their ability to sense and control body positioning. This heightened awareness extends beyond the realm of sport, permeating into daily life, where improved posture and breath control translate into enhanced well-being and resilience. Thus, breathing exercises emerge as a cornerstone of athletic development, empowering athletes to optimize their performance while safeguarding against potential injuries, ultimately contributing to their enduring success on and off the field[3]. Athletes who

integrate breathing exercises into their regimen develop a deeper understanding of their body's alignment and mechanics. This understanding empowers them to optimize their posture, ensuring that they maintain the most advantageous position for their sport. Additionally, the focus on controlled breathing facilitates the activation of abdominal muscles, providing crucial support to the spine. This enhanced stability not only reduces the risk of injury but also serves as a foundation for executing athletic maneuvers with precision and power[4].

The Bosu ball stands out as a versatile and effective tool for balance therapy, renowned for its controllability, safety, and efficiency. Its adaptability makes it an invaluable asset in diverse workout routines, catering to a wide array of fitness goals and requirements. Among its many applications, the Bosu ball excels at bolstering trunk stability, fortifying core muscles, and enhancing the functionality of lower limbs. Whether used in rehabilitation settings or high-performance training environments, the Bosu ball offers a dynamic platform for individuals to improve their balance and proprioception while targeting specific muscle groups[5]. The Bosu ball serves as a valuable tool for promoting functional fitness by simulating real-life movements and challenges. Constructed with an inflatable rubber bladder that is securely fitted into a robust plastic base, the Bosu ball embodies durability and stability. When placed on a stable ground with the solid surface. facing downwards, it provides an unstable surface, challenging the user to maintain balance. This feature is instrumental in the ball's application for improving balance, strength, and coordination, making it a versatile tool in fitness and rehabilitation settings[6].Its dynamic surface requires constant adjustments in balance and stability, mirroring the demands of everyday activities and athletic endeavors. As individuals engage in exercises on the Bosu ball, they not only strengthen their muscles but also improve their coordination, agility, and overall movement efficiency. This functional approach to training translates into enhanced performance in various physical tasks, from lifting objects to navigating uneven terrain, ultimately fostering greater independence and resilience in daily life[5]. The unique design and functional versatility of the Bosu ball make it an invaluable asset in physical therapy and workout regimens aimed at enhancing an individual's physical wellbeing. By offering an unstable platform, it stimulates the body's balance mechanisms, thereby facilitating comprehensive engagement of muscle groups and contributing to overall improved fitness levels. Whether used in a professional setting for therapeutic purposes or incorporated into personal workout routines, the Bosu ball stands out as an effective means for achieving fitness goals related to balance, strength, and coordination[6].

There was research been done on effectiveness of Balance Training and Respiratory Training in air rifle shooters but no study has been done on comparison and combination of Balance Training with BOSU ball and Respiratory training with Spirometer and hence the above study was conducted.

MATERIALS AND METHODOLOGY

The Comparative Experimental study was conducted at the Vedh academy and Target Shooting Olympic academy in Kolhapur. 85 subjects were approached and 71 who met the inclusion and exclusion criteria.

Inclusion criteria- Participants aged between 14-24 years, belonging to both the genders and having Two or more than two years of experience.

Exclusion criteria- Participants with history of Asthma and recent history of history, knee
and lumbar surgeries, any neurological disorder that impaired body function (epilepsy, migraine).

The ethical clearance for conducting the study was secured by obtaining approval from the institutional ethical committee. Following the ethical clearance, the participants underwent a thorough screening process, adhering to specific inclusion and exclusion criteria to ensure the appropriateness of their participation in the study. Written consent was obtained from all participants. Subsequently, baseline values for each participant will be meticulously recorded. The study design involves the formation of two distinct groups, each comprising 36 individuals. This division facilitates a comparative analysis of different intervention strategies on respiratory training and balance. Group A's regime included respiratory training utilizing a spirometer—requiring the ball to be held for increasing durations over the six-week period—complemented by diaphragmatic and pursed-lip breathing exercises. These activities were

performed while the participant were seated, maintaining a 90-degree flexion at the hip and knee joints. Conversely, Group B were engaged in a more comprehensive regimen that combines respiratory training with balance exercises using a bosu ball. The complexity and intensity of the exercises were progressively adjusted over the course of the study, tailored to enhance both respiratory functions and balance. The intervention span was of six weeks, comprising two sessions per week, lasting for 15 to 20 minutes. The effectiveness of the training was evaluated using a series of tests, including the breath hold test for assessing breath-holding capacity, and both the Single-leg stance test and Tandem walk test, performed with eyes open and closed, to evaluate balance. These assessments were designed to quantitatively measure the impact of the respective training regimens on the participants' respiratory and balance capabilities. Statistical analysis of the collected data was performed.

RESULT

Group	Time point	Mean	SD	P value
Control (Group B)	Pre Post	78% 83%	9% 9%	2.21E-59
Experimental (Group A)	Pre Post	86% 87%	10% 10%	1.47E-05

Table 1 : Pre post comparisons

Table 2: Post comparison

Group	Mean	SD	P Value
Control Experimental	83% 87%	9%. 10%	 0.03

DISCUSSION

The aim of this study was to study the effect of bosu ball and spirometer on balance and respiration training in Air Rifle Shooters. Objective of finding the effect of bosu ball exercise in Air Rifle Shooters . Effect of spirometer and breathing exercises in Air Rifle Shooters Compare the effect of bosu ball and spirometer in Air Rifle Shooters. The individuals included in this study were the age between 14-24 . Participants of both genders (male and female) and Two more years of experience. The study was done in Vedh Academy and Target Shooting Academy in Kolhapur. Total number of participants was 71. Participants were selected according to criteria. Participants were randomly divided into 2 group, Group A (experimental group) and Group B (control group).

Group A Experimental group was trained for respiratory training by breathing exercises, spirometer and bosu ball for balance training. Group B (CG) was trained for only respiration by breathing exercises and spirometer. Study was carried out for 6 weeks and 2 sessions was taken per week. Pre and Post assessment was taken using outcome measure. Outcome measure used for the assesment were 1) Single leg stance with open eyes, 2) Single leg stance with closed eyes , 3) Tendem walk with open eyes, 4) Tendem walk with closed eyes this test were used for assessing balance 1) spirometer and Breath hold test for Respiratory assesment . Group B control group will be given Respiratory training with Spirometer (ball should be hold till 8 second for 1-2 week, 12 seconds for 3-4 week and 15 seconds for 5-6 week), Diaphragmatic breathing and Pursed-lip breathing exercises while sitting on a chair with 90-degree flexion of hip and knee joint. Group A experimental group will be given Respiratory as well as Balance training with Bosu ball (1-2 week: 2sets with 15 repetitions of Stepping up and down as well as single leg balance for 15 seconds: for 3-4 weeks : Sit up and down 2 sets with 15 repetitions and planks hold for 15 seconds ; for 5-6 weeks : back extension and single leg stance). The data was statistically analysed.

Intra group compression pre and post in Experimental group after respiratory and balance training there was a significant improvement by 1.47E-05.

Intra group compression pre and post in control group after respiratory training there was a significant improvement is post of training by 2.21E-59.

Comparison between both the groups there was significant improvement in Experimental group then in Control group p value -0.03 .

Prior research indicated that respiration and balance training increase respiratory function more The relationship between body sway, aim point fluctuation, and performance in rifle shooters is demonstrated by the relationship between body sway, performance, and aim point fluctuation. By Kevin Ball , Russell Best and Tim Wrigley[2] . Impact of Breathing Patterns The outcome of shooting stability is partially influenced by breathing patterns that are erratic during the release phase of a shot. By M.N. Mohamed, W.M.N. Wan, W.M.N. Wan Norman. A. Linoby. M.H. Sariman[3].

CONCLUSION

The above study concluded that Respiratory and Balance training with spirometer and bosu ball was more effective than the respiratory training alone to improve the performance of the air rifle shooters. As Bosu Ball focused of core muscles and lower extremity which helps the athletes to perform better without fatigue.

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