

REVOLUTIONIZING TENNIS EXCELLENCE: THE SWISS BALL SAGA AND ITS GAME-CHANGING IMPACT ON PLAYERS' PHYSICAL PROWESS

Dr. R. Sevi¹, Waseem Ahmad Bhat²

¹Assistant Professor Department of Physical Education, Annamalai University, Annamalai Nagar (TN) India-608002

²Research Scholar Department of Physical Education, Annamalai University, Annamalai Nagar (TN) India-608002

Corresponding author: r.sevijo@gmail.com, Waseembhat1993@gmail.com

Abstract

The objective of this investigation is to scrutinize the impact of Swiss-ball training on chosen physical factors among male tennis players. Methodology: This study adopts an experimental research approach with a pre- and post-test design, incorporating both a swiss ball training group and a control group. Thirty male participants were chosen for this research and divided into two groups: Group A (n=15) designated as the experimental group and Group B (n=15) as the control group. Participants' ages encompassed a range from 18 to 23 years. The SBT program was structured to include three sessions every week, and each session extended for duration of 45 minutes. Subjects were assessed both before and after the 8-week session. In the realm of statistical scrutiny, ANCOVA and the prowess of SPSS 22 were harnessed for meticulous analysis. The confidence threshold for the level of impact was set at 0.05. Observations and Discussion: The results pointed to a significant influence of SBT on the designated physical traits, encompassing muscular endurance, and flexibility. Conclusion: It is manifestly clear that engaging in SBT proves to be advantageous for the enhancement of physical variables. Expanding the number of training sessions per week is poised to yield more substantial effects, contributing to a noteworthy improvement in the overall fitness levels among the student population.

Keywords: *Physical, Exercise, Muscular Endurance, Flexibility and Swiss Ball training (SBT).*

1. INTRODUCTION

The Swiss ball, also recognized as an exercise or gym ball, serves as a valuable training tool primarily focused on enhancing flexibility and strengthening various muscle groups, including the abdominals, groin, lower back, and upper legs. These inflatable balls are typically filled to about 80-90% capacity and are made of a durable rubberized material, coming in different size options. For optimal effectiveness, it is recommended that the Swiss ball be positioned approximately 2 inches (5 cm) above the user's knee when on the surface (Arnheim et al., 2006). Swiss ball exercises are categorized as rubber resistor training, contributing to increased resistance across the entire muscle groups engaged. This heightened resistance leads to the enhancement and fortification of abdominal and back muscles. Consequently, Swiss ball exercises are incorporated into fitness development sessions, aiming to boost overall muscle power (Jenny, 2006; Better, 2004). Additionally, the Swiss ball proves to be valuable in assessing and enhancing balance and coordination skills (Beate, 2005)..

2. RESEARCH METHOD

This study adopts an experimental design, involving the implementation of Swiss Ball Training (SBT) for the experimental group and a control group, with both groups undergoing pre-tests and post-tests. The research enlisted thirty college-level tennis players from Annamalai University Campus in Tamil Nadu, India, selected randomly to participate in the study. Each group, comprising 15 participants, was assigned, with Group A designated as the experimental group (n=15) and Group B as the control group (n=15). The participants' age ranged from 18 to 23

on average. The SBT program consisted of 45-minute sessions conducted thrice a week over an 8-week period. Prior to and following the intervention, all subjects underwent testing. The test procedures were explained verbally and clearly to each participant, addressing any uncertainties they may have had. Distribution of a handout and a timetable facilitated the collection of information regarding the students' daily workout routines and intensity levels.

Selection of subjects:

Thirty college-level tennis players from Annamalai University Campus in Tamil Nadu, India, were randomly selected to participate in this research, aligning with the study's objectives. The participants' ages ranged from 18 to 23 years

Selection of Variables

The selection of "Muscular Endurance" and "Flexibility" as variables for the experimental study on the impact of swiss ball training among tennis players is rooted in their paramount significance to athletes' overall physical fitness and on-field performance. Swiss ball training can significantly benefit tennis players by enhancing both muscular endurance and flexibility. In tennis, where repetitive and dynamic movements are prevalent, muscular endurance is vital for sustaining performance and minimizing fatigue-related injuries. Swiss ball exercises, introducing instability, engage stabilizing muscles and mimic the demands of tennis movements, effectively improving overall muscular endurance. Additionally, the full range of motion required in many Swiss ball exercises promotes flexibility, crucial for executing the diverse and multidirectional actions inherent in tennis. Strengthening the core through Swiss ball exercises further contributes to stability and injury prevention, making Swiss ball training a valuable and holistic approach for tennis players aiming to optimize their on-court performance.

Independent Variables

For this experiment, two distinct groups were selected—one designated as the experimental group and the other as the control group. This setup enabled a comparison of the outcomes between the two groups.

- Swiss ball Training

Dependent Variables

- Physiological Parameters
- Muscular Endurance
- Flexibility

Selection of test items

The main aim of this study was to investigate the impact of Swiss ball training on the Muscular Endurance and Flexibility of tennis players. The researcher selected the most appropriate assessments for the study after consulting with experts, physical education specialists, and reviewing pertinent literature, as detailed in the table below.

TABLE-1. INFORMATION PERTAINING TO PHYSICAL FACTORS, EVALUATIONS, AND UNITS OF MEASUREMENT.

S.No	Criterion Variables	Test Items	Unit of Measurement
1	Muscular Endurance	Bend Knee Sit-up(60 Sec)	Numbers/min
2	Flexibility	Sit and Reach Test	Centimeters

Training Protocol

Table-2

TRAINING SCHEDULE FOR SWISS BALL EXERCISE

DURATION : 8 weeks WARMING-UP : 05 minutes
 TIME : 45 minutes COOL-DOWN : 10 minutes
 FREQUENCY : 3 days

Weeks	Swiss ball exercise	Intensity	Set & Rept.	Frequency	Rest between set	Rest between exercise
1-2 rd	Swiss ball exercise	50%	4x8	3 days	7-15 sec.	5-10 sec.
3-4 th	Swiss ball exercise	60%	4x10	3 days	7-15 sec.	5-10 sec.
5-6 th	Swiss ball exercise	70%	4x12	3 days	10-20 sec.	5-15 sec.
7-8 th	Swiss ball exercise	80%	5x14	3 days	20-30 sec.	10-20sec.

Swiss ball exercises:

Ball push-up, Ball crunch, Ball jackknife, Ball squat, Ball bridge, Ball reverse crunch, Ball lift, Forward & back with ball, Ball up & down, Ball full stretch.

Statistical Analysis

The data was analyzed using suitable statistical methods, with the statistical software SPSS-22 being employed. Significance determination was conducted through ANCOVA, and the statistical significance level was set at a confidence level of 0.05. Comprehensive details of the results are provided below.

3. RESULTS AND DISCUSSION

ANALYSIS OF DATA

Muscular Endurance

The pre-test and post-test scores for muscular endurance in both the Swiss ball training group and the control group underwent analysis of covariance, and the results are displayed in Table 3.

TABLE-3
ANCOVA FOR PRE-TEST AND POST-TEST SCORES OF MUSCULAR ENDURANCE FOR SBT AND CT

TEST	Swiss ball Training	Control Group	Source of Variance	Sum of Squares	Df	Mean Squares	Obtained 'F' ratio
Pretest							
Mean S.D	42.27 2.37	42.07 1.94	Between Within	0.300 131.867	1 28	0.300 4.710	0.06
Posttest	48	42.33	Between	240.833	1	240.833	52.96*
Mean S.D	2.39	1.84	Within	127.333	28	4.548	
Adjusted Posttest	47.96	42.37	Between	234.195	1	234.195	57.43*
Mean			Within	110.103	27	4.078	

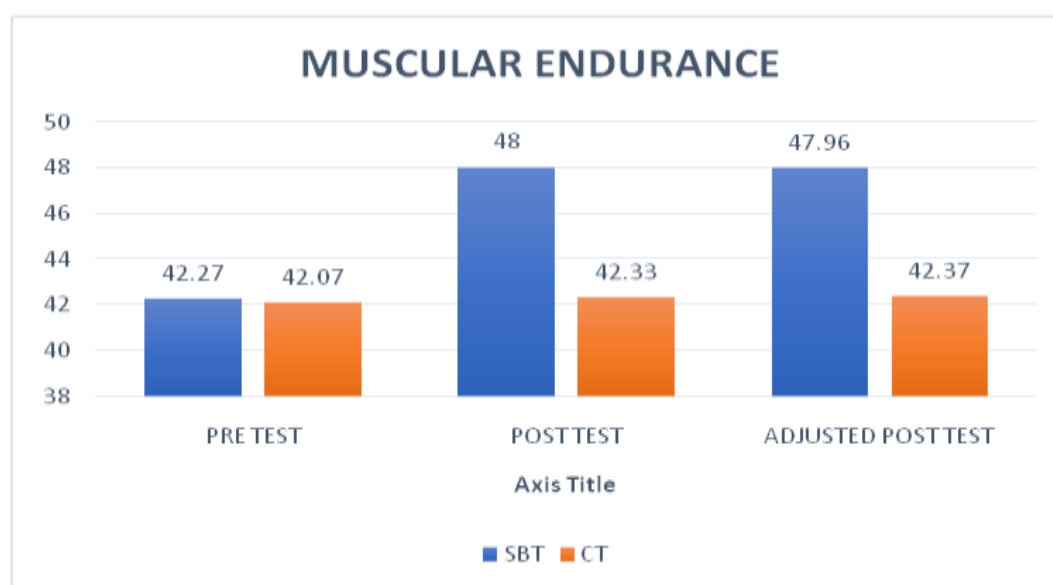
The table indicates critical values for a significance level of 0.05 with degrees of freedom 1, 28, and 1, 27 as 4.20 and 4.21, respectively.

Table-3 presents pre-test mean values for the swiss ball training and control groups as 42.27 and 42.07. The computed pre-test 'F' ratio of 0.06 suggests no significant difference in pre-test scores between the groups, falling below the critical 'F' ratio of 4.20 for degrees of freedom (df) as 1 and 28. However, in the post-test, the swiss ball training group's mean is 48, and the control group's mean is 42.33, yielding an 'F' ratio of 52.96, surpassing the table 'F' ratio value of 4.20 (with degrees of freedom 1 and 28), indicating a considerable difference in post-test scores.

After adjusting for covariates, the post-test mean values for muscular endurance are 47.96 for the swiss ball training group and 42.37 for the control group. The 'F' ratio of 57.43 exceeds the table 'F' ratio value of 4.21 (with degrees of freedom 1 and 27), affirming a notable difference in muscular endurance between these groups. In summary, the study's results underscore a significant disparity in muscular endurance between the Swiss ball training group and the control group.

Figure-1 visually represents the adjusted post-test means in the form of a bar chart for a clearer interpretation of these findings.

FIGURE-1
BAR CHART ILLUSTRATING ADJUSTED POST MEAN VALUES ON MUSCULAR ENDURANCE



Flexibility

The pre-test and post-test scores for flexibility in both the Swiss ball training group and the control group underwent analysis of covariance, and the results are displayed in Table 4.

TABLE-4
ANCOVA FOR PRE-TEST AND POST-TEST SCORES OF FLEXIBILITY FOR SBT AND CT.

TEST	Swiss ball training	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' ratio
Pretest							
Mean S.D	21.24 1.02	21.33 1.12	Between Within	0.056 31.910	1 28	0.056 1.140	0.05
Posttest Mean S.D	24.48 1.03	21.51 1.32	Between Within	65.979 39.376	1 28	65.979 1.406	46.92*
Adjusted Posttest Mean	24.462	21.525	Between Within	64.586 35.833	1 27	64.586 1.327	48.67*

*Significant at 0.05 level of confidence.

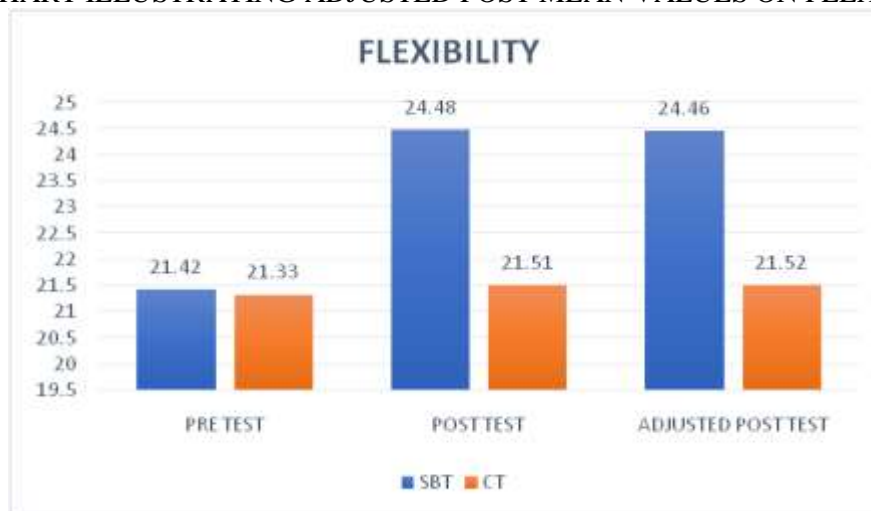
The table indicates critical values for a significance level of 0.05 with degrees of freedom 1, 28, and 1, 27 as 4.20 and 4.21, respectively.

Table-4 presents pre-test mean values for the swiss ball training and control groups as 21.24 and 21.33. The computed pre-test 'F' ratio of 0.05 suggests no significant difference in pre-test scores between the groups, falling below the critical 'F' ratio of 4.20 for degrees of freedom (df) as 1 and 28. However, in the post-test, the swiss ball training group's mean is 24.48, and the control group's mean is 21.51, yielding an 'F' ratio of 46.92, surpassing the table 'F' ratio value of 4.20 (with degrees of freedom 1 and 28), indicating a considerable difference in post-test scores.

After adjusting for covariates, the post-test mean values for flexibility are 24.46 for the swiss ball training group and 21.52 for the control group. The 'F' ratio of 48.67 exceeds the table 'F' ratio value of 4.21 (with degrees of freedom 1 and 27), affirming a notable difference in flexibility between these groups. In summary, the study's results underscore a significant disparity in flexibility between the Swiss ball training group and the control group.

Figure-2 visually represents the adjusted post-test means in the form of a bar chart for a clearer interpretation of these findings.

FIGURE-2
BAR CHART ILLUSTRATING ADJUSTED POST MEAN VALUES ON FLEXIBILITY



DISCUSSION

We conducted a study to investigate the impact of Swiss ball training on the muscular endurance and flexibility of tennis players. Thirty participants were randomly assigned to either the experimental group (Group I), which underwent 8 weeks of Swiss ball training, or the control group (Group II), receiving no specialized training beyond their regular physical education classes. The study revealed a significant improvement in both muscular endurance and flexibility within the Swiss ball training group compared to the control group. Thus, the results indicated notable enhancements in muscular endurance and flexibility among participants in the Swiss ball group. These findings align with similar research conducted by others. Anbalagan et al., (2020) Swiss ball training, conducted three times a week for twelve weeks, significantly improved speed, strength, flexibility, agility, and balance in school children (ages 9 to 14) with postural deformities. The study underscores the positive impact of Swiss ball exercises on the physical fitness of this demographic. Logeswaran et al., (2022) in his six-week study with 30 adolescent girls basketball players, Swiss ball exercise training significantly improved muscular strength, flexibility, balance, and agility. This suggests the efficacy of incorporating Swiss ball exercises for enhancing physical fitness in this demographic. Kumar et al., (2012) conclude that the study assessed the impact of Swiss ball training (SBTG) and crunches exercise (CEG) on muscular and abdominal strength among 30 sedentary male students.

The 12-week intervention demonstrated that both SBTG and CEG were effective in improving muscular and abdominal strength compared to the control group. However, crunches exercise (CEG) showed a more beneficial effect on both muscular strength and abdominal strength than Swiss ball training (SBTG). Mishra & Kanaujia et al., (2021) also concluded the study aimed to assess the impact of Swiss ball exercises on muscular endurance and strength in male students. The 12-week Swiss ball training (SBTG) demonstrated significant improvements in back strength and muscular endurance, while no significant effect was observed on leg strength. The findings suggest that Swiss ball core exercises are effective for enhancing back strength and muscular endurance but may not be as impactful for improving leg strength in the studied population. Nagla (2011) found that an 8-week Swiss ball exercise program with women karateka (18-20 years) led to significant improvements in abdominal, back, and leg muscle strength, hip and spine flexibility, static and dynamic balance, and vital capacity. These enhancements correlated with improved Gankaku Kata performance levels. The findings underscore the effectiveness of Swiss ball exercises in positively influencing both physical fitness and kata performance in female karate athletes. Nashwa, (2011) conducted a study to assess the impact of Swiss ball training on specific

motor abilities in college girls. The study results demonstrated that Swiss ball training significantly enhanced abdominal strength, flexibility, and endurance among the college girls.

Moreover, the results of this study are consistent with the principles of progressive overload, where gradual increases in resistance contribute to improved physical performance. The introduction of resistance through Swiss ball training may have led to adaptations in various physical variables throughout the 8-week duration. It is crucial to acknowledge that, while this study provides valuable insights into the potential advantages of Swiss ball training, further research with larger sample sizes and extended durations could offer more comprehensive perspectives on its effects on muscular endurance and flexibility. Additionally, considering potential confounding factors like diet, sleep, and other lifestyle elements could provide a more nuanced understanding of the observed enhancements.

4. CONCLUSION

In conclusion, this research suggests that a 8-week Swiss ball training program significantly enhances muscular endurance and flexibility among tennis players. The study offers valuable insights into the benefits of Swiss ball training for improving these aspects in male tennis players. The significant differences observed in post-test scores support the effectiveness of this training method in enhancing physical fitness. However, it is essential to note that this study had limitations, including a relatively small sample size and a focus specifically on male tennis players. Future research with larger and more diverse participant groups is needed to validate these findings and explore the broader applications of Swiss ball training in enhancing both physical and physiological functions..

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