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ISOLATED AND COMBINED EFFECTS OF SWISS BALL AND KETTLEBELL TRAINING INDUCED ADAPTATIONS ON BACK STRENGTH OF ADOLESCENT BOYS

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Abstract

The aim of this investigation was to study the effect of isolated and combined Swiss ball and kettle bell training on Back Strength of adolescent boys. To achieve the purpose of this study, the investigator selected sixty adolescent boys as participants in the age group of 13 to 18 years from Andaman and Nicobar Island. They were divided into four groups of fifteen subjects each. Group-I underwent Swiss ball training, group-II underwent kettle bell training, group-III underwent combined Swiss ball and kettle bell training and group-IV acted as control. The data collected from the four groups prior to and post experimentation on Back Strength was statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since four groups were involved, whenever the obtained 'F' ratio value was found to be significant for adjusted post-test means, the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. Due to Swiss ball (STG =6.34%), kettle bell training (KTG) =14.88%) and combined Swiss ball and kettle bell training (SKTG = 10.64%) the adolescent boy's Back Strength was improved greatly.

Keywords: *Swiss ball and Kettle bell training, Back Strength of Adolescent boys*

Introduction

Various programs related to strength training have emerged in recent years. They are designed to emphasize the importance of strengthening core muscles. These include the muscles of the trunk and pelvis, as well as the muscles of the legs, arms, and shoulders. Athlete-specific core training is critical. As a result, specific muscle groups in the core become very important for a given individual. Athletes must work hard to strengthen their trunk and pelvic muscles. The unique feature of most core training programs is that they exercise the lower back and abdominal muscles at the same time. Core strength training is used extensively to provide training for multi-plane, dynamic, and multi-directional

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movements. If core strength training and related exercises are used correctly, these movements will improve significantly (Hubscher, 2010 & Sadoghi, 2012).

Swiss ball training is said to improve both neuromuscular and cardiovascular function. Furthermore, Swiss ball training is said to be superior to traditional abdominal training for developing a stable midsection, which is said to be essential for optimal function. However, empirical data to back up the claims made by clinicians, trainers, and Swiss ball users is lacking. Data from Swiss ball studies conducted thus far show that the abdominal musculature is activated more than in other forms of abdominal training. Furthermore, based on published and unpublished training studies to date, it appears that Swiss Ball training may lead to increased core stability; however, this is not reflected in improved athletic performance. Unlike other physical parameters, it appears that there is no 'Gold Standard' for quantifying core stability. This, combined with the lack of sensitivity of athletic performance measures used in previous studies, has most likely resulted in a lack of significant findings. Thus, the prescription of Swiss ball exercises should be viewed with caution until a measure of core stability is defined and performance outcome measures are rigorously controlled.

In recent years, the concept of Swiss ball and kettle bell training has sparked debate among sports scientists and trainers. The research literature does not contain all of the answers, and practitioners report varying degrees of success when employing a variety of modes and techniques. The challenge of increasing human muscle power for sports performance is based on the use of a variety of training approaches, and the literature generally agrees that some form of exercise involving near maximal efforts will improve strength and power output.

Several studies have shown that physical fitness components can be improved through systematic training, but no study has compared the effect of isolated and combined Swiss ball and kettle bell training on back strength in adolescent boys. Researchers have gained a better understanding of how the human body reacts to exercise, training, different environments, and a variety of other stimuli through the study of science and various sports training. The current scientific study is one of several efforts to investigate and suggest the benefits of three training concepts, including Swiss ball and kettle bell training, and their combination for adolescent boys.

Methodology

The researcher had gone through the available literature and had discussions with various experts and with his guide before selecting variables. To achieve the purpose of this study, the investigator selected sixty adolescent boys as participants in the age group of 13 to 18 years from Andaman and Nicobar Island. They were divided into four groups of fifteen subjects each. Group-I underwent Swiss ball training, group-II underwent kettlebell training, group-III underwent combined Swiss ball and kettlebell training and group-IV acted as control, they did not participate in any training programme. The selected subjects were medically examine by a qualified physician in order to check whether they are medically and physically fit enough to undergo the training programme. All participants were informed

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about the nature of study and their consent were obtained for co-operation till the end of the experiment. The consent form for the proposed research study was collected from the participants.

Training Programme

In this study, training was done under close supervision with frequent adjustments in training intensity to maintain the desired training stimulus. When appropriate, attempts were made to increase the training load using judgment of the exercise technique and perceived exertion. Training programme was administered to the adolescent boys for twelve weeks. The experimental group-I performed Swiss ball training, group-II performed kettle ell training, and group-III performed combined Swiss ball and kettle bell training. The training programme lasted for twelve weeks with three training units per week on alternate days. Group-IV was the control group they did not undergo any training. The total training volume for all the three groups were same however group-I performed with Swiss ball, group-II performed with kettle bell and group-III performed combined Swiss ball and kettle bell exercises.

Statistical Technique

The experimental design used in this study was random group design involving 60 subjects, who were divided at random in to four group of fifteen each. All the four group subjects were selected from the same population. No effort was made to equate the groups prior to the commencement of the experimental treatment. The pre test means of the selected dependent variable was used as a covariate. The data collected from the four groups prior to and post experimentation on selected dependent variables were statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since four groups were involved, whenever the obtained 'F' ratio value was found to be significant for adjusted post test means, the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases the level of confidence was fixed at 0.05 for significance.

Result

The descriptive and dependent 't' test statistics results, on back strength of adolescent boys belong to isolated and combined Swiss ball and kettle bell training and control (STG, KTG, SKTG & CG) group's is shown in table-I.

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Table-I

Descriptive Analysis on Back Strength of Isolated and Combined Swiss Ball and Kettle bell Training and Control (STG, KTG, SKTG & CG) Group's Adolescent Boys

Groups Selected	Tests	No	Mean Scores	S.D	M. Diff.	't' – test	Progress in%
Swiss Ball (STG)	Before Training	15	71.13	1.95	2.13	11.12*	3.01*
	After Training		73.26	2.21			
Kettle Bell (KTG)	Before Training	15	71.40	2.09	3.73	7.58*	5.22*
	After Training		75.13	2.10			
Combined Training (SKTG)	Before Training	15	71.33	1.91	6.00	8.96*	8.43*
	After Training		77.33	2.69			
Control (CG)	Before Training	15	71.60	2.09	0.06	0.26	0.09
	After Training		71.66	2.02			

*df 14=2.14(Table value-.05level)(*significant)*

The descriptive analysis and dependent't' test statistics results, confirm that the back strength of adolescent boys found between pre (initial) and post (final) test of isolated and combined Swiss ball and kettle bell training and control (STG, KTG, SKTG & CG) group's differ obviously, as the 't' values (paired t- test) 11.12 (STG), 7.58(KTG) and 8.96(SKTG) are more than essential table(df14=2.14) value. Due to Swiss ball (STG =3.10%), kettle bell training (KTG) =5.22%) and combined Swiss ball and kettle bell training (SKTG = 8.43%) the adolescent boy's back strength was improved very much.

In this below table, the calculated ANCOVA statistic result on back strength of adolescent boys belong to isolated and combined Swiss ball and kettle bell training and control (STG, KTG, SKTG & CG) group's are given.

Table – II

ANCOVA Results on Back Strength of Isolated and Combined Swiss Ball and Kettlebell Training and Control (STG, KTG, SKTG& CG) Group's Adolescent Boys

Mean	Swiss Ball (STG)	Kettle Bell (KTG)	Combi-ned (SKTG)	Con-trol (CG)	So V	SS	df	MS	'F' ratio
Adjusted Post-test	73.44	75.10	77.35	71.48	B	279.36	3	93.12	33.34*
					W	153.63	55	2.79	

*(Table value for df 3 & 55= 2.77)*Significant (.05 level)*

The applied ANCOVA statistics 'f' (33.34) value make obvious that the adjusted back strength mean scores of Swiss ball (STG =73.44%), kettle bell (KTG =75.10%), combined

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treatment (SKTG = 77.35%) as well as control groups (CG=71.48) adolescent boys belong to fluctuate from one another. Because the isolated and combined Swiss ball and kettle bell training and control (STG, KTG, SKTG & CG) group's back strength adjusted 'F' value (33.34) is more than 2.77 (table value) for df (degrees of freedom) 3 and 55.

In this below presented table, the calculated post hoc test result on back strength of isolated and combined Swiss ball and kettle bell training and control (STG, KTG, SKTG & CG) group's adolescent boys are given.

Table – III

Post Hoc Analysis Results on Back Strength of Isolated and Combined Swiss Ball and Kettlebell Training and Control (STG, KTG, SKTG& CG) Group's Adolescent Boys

Swiss Ball (STG)	Kettle Bell (KTG)	Combined (SKTG)	Control (CG)	M.D	C.I
73.44	75.10			1.66	1.75
73.44		77.35		3.91*	1.75
73.44			71.48	1.96*	1.75
	75.10	77.35		2.25*	1.75
	75.10		71.48	3.62*	1.75
		77.35	71.48	5.87*	1.75

**Significant (.05)*

It **(Scheffe's test results)** makes obvious that because of Swiss ball (STG =1.96), kettle bell (KTG =3.62) and combined treatment (SKTG = 5.87) the adolescent boy's back strength was enhanced immensely, because when comparing these treatment groups with control groups (1.96, 3.62 & 5.87) the MD are superior to 1.75 (CI value). Although, combined Swiss ball and kettle bell training (SKTG) was better to Swiss ball training (STG), however, when comparing Swiss ball with kettle bell (STG & KTG =1.66) did not differ from each other.

The below presented graph(Figure-I), showing back strength of adolescent boys belong to isolated and combined Swiss ball and kettle bell training and control (STG, KTG, SKTG & CG) groups.

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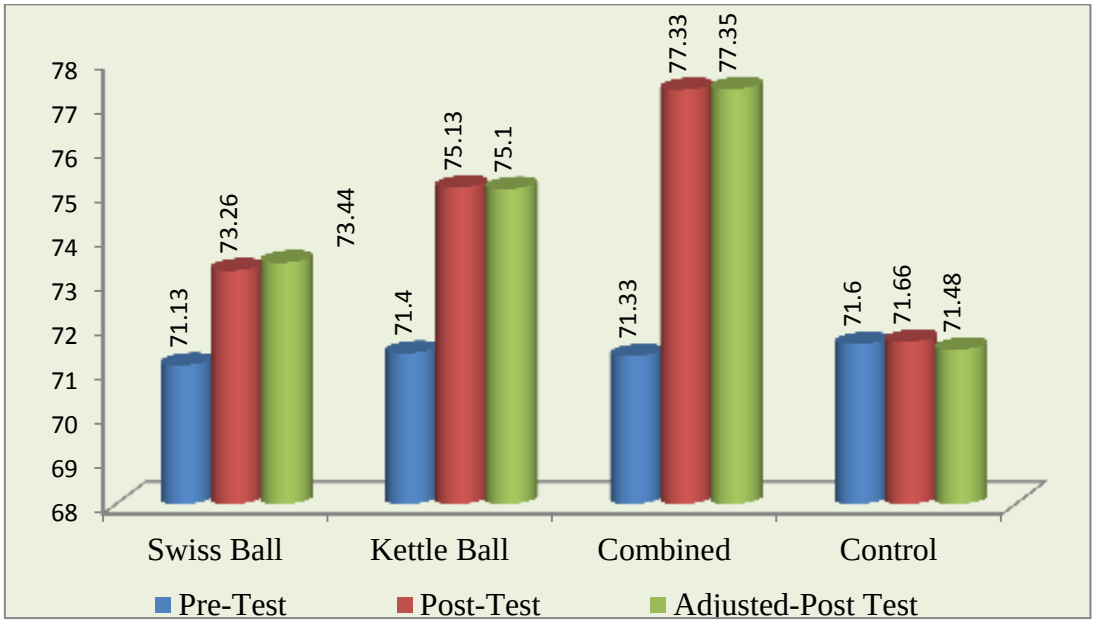
Figure – I

Graph Showing the Back Strength of Adolescent Boys Belong to Isolated and Combined Swiss Ball and Kettle Bell Training and Control Groups



The above findings can also be substantiated by observations made by renowned experts in the science of sports training. One advanced Swiss ball exercise providing a significant whole-body stimulus (Marshall & Desai, 2010). A primary benefit of exercising with an exercise ball as opposed to exercising directly on a hard flat surface is that the body responds to the instability of the ball to remain balanced, engaging many more muscles (Vera-Garcia, Grenier& McGill, 2000). Most frequently, the core body muscles such as the abdominal muscles and back muscles are the focus of exercise ball fitness programs. Those muscles become stronger over time to keep balance (Mayo, 2007).

Both men and women, younger and elderly, and individuals with and without pain benefitted equally from Swiss ball with elastic resistance exercises (Sundstrup*et al*., 2012). Swiss-ball core strength training exercises can be used to provide improvement in the 60 and 90° s trunk flexion/extension, 60 and 240° s-1 lower limb flexion/extension, abdominal endurance, lower back muscular endurance, lower limb endurance, lower back flexibility, and dynamic balance measures in sedentary women (Sekendiz, Cug&Korkusuz, 2010). Swiss ball training has significant effect on abdominal strength of sedentary girls (Mathew &Vasanthi, 2013)

Resistance training in an unstable environment at intensity sufficient to elicit strength gains (Drinkwater, Pritchett & Behm, 2007), increase in work capacity and abdominal power (Cowley, Swensen & Sforzo, 2007). Similar enhancement of power was found in concentric phase of countermovement squats on stable and unstable support surface regardless of weights lifted (Zemkova & Hamar, 2013). Swiss ball provides a training stimulus for the rectus abdominus (Marshall & Murphy, 2005) and core stability (Stanton, Reaburn & Humphries, 2004). Muscle activity was greater when exercises were performed on a Swiss

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ball in comparison to a stable surface (Duncan, 2009). No differences were observed in 1RM strength or muscle EMG activity and elbow range-of-motion during the barbell chest press exercise performed on a stable (*flat bench*) and unstable surface (*exercise ball*) (Goodman *et al*., 2008).

Conclusion

This study provides practical implications for strength and conditioning specialists who supply exercise programs for adolescent boys. The Swiss-ball core strength training and kettle bell protocol used in this study can be done in isolation or integrated into training programs to strengthen the body. However, it should be understood that the findings of this study may only be applicable to the population under investigation. Furthermore, while the findings of this study may similar to the current thoughts and practices of strength and conditioning professionals, coaches, and athletes, it necessarily to encourage the use of Swiss balls and kettle bell, because evidence from this and previous investigations demonstrate that strength and power parameters can be improved by the inclusion of Swiss ball, kettle bell and combined training into an existing training program. The exercises can be gradually modified to complement for individual differences and needs. Thus, the use of Swiss balls and kettle bell programs may be warranted. To date, their contribution to enhanced physical performance remains unanswered and future studies should investigate the manipulation of program variables and exercise selection. In light of the findings of this study, the use of Swiss ball and kettle bell training either alone or in combination to enhance strength and power appears promising. However, whether gains in strength and power achieved through such training are converted to enhanced physical performance remains to be demonstrated. Further research is required to determine the effectiveness of Swiss ball and kettle bell training for the enhancement of physical performance.

References

1. Cowley, P. M., Swensen, T., & Sforzo, G. A. (2007). Efficacy of instability resistance training. *International journal of sports medicine*, 829-835.
2. Desai, I., & Marshall, P. W. (2010). Acute effect of labile surfaces during core stability exercises in people with and without low back pain. *Journal of Electromyography and Kinesiology*, *20*(6), 1155-1162.
3. Drinkwater EJ, Pritchett EJ, Behm DG. (2007). Effect of instability and resistance on unintentional squat-lifting kinetics, *International Journal of Sports Physiology and Performance*, 2(4): 400-13.
4. Goodman, C. A., Pearce, A. J., Nicholes, C. J., Gatt, B. M., & Fairweather, I. H. (2008). No difference in 1RM strength and muscle activation during the barbell chest press on a stable and unstable surface. *The Journal of Strength & Conditioning Research*, *22*(1), 88-94.
5. Hubscher M, Zech A, Pfeifer K, Hansel F, Vogt L, Banzer W. (2010) Neuromuscular training for sports injury prevention: a systematic review. *Med Sci Sports Exerc*. 42:413-421.

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 11, Iss 11A, 2022

6. Marshall, P. W., & Murphy, B. A. (2005). Core stability exercises on and off a Swiss ball. *Archives of physical medicine and rehabilitation*, *86*(2), 242-249.
7. Sadoghi P, von Keudell A, Vavken P. (2012) Effectiveness of anterior cruciate ligament injury prevention training programs. *J Bone Joint Surg Am*, 94:769-776.
8. Sekendiz, B., Cug, M., & Korkusuz, F. (2010). Effects of Swiss-ball core strength training on strength, endurance, flexibility, and balance in sedentary women. *The Journal of Strength & Conditioning Research*, *24*(11), 3032-3040.
9. Stanton, R., Reaburn, P. R., & Humphries, B. (2004). The effect of short-term Swiss ball training on core stability and running economy. *The Journal of Strength & Conditioning Research*, *18*(3), 522-528.
10. Sundstrup, E., Jakobsen, M. D., Andersen, C. H., Jay, K., & Andersen, L. L. (2012). Swiss ball abdominal crunch with added elastic resistance is an effective alternative to training machines. *International Journal of Sports Physical Therapy*, *7*(4), 372–380.
11. Vera-Garcia, F. J., Grenier, S. G., & McGill, S. M. (2000). Abdominal muscle response during curl-ups on both stable and labile surfaces. *Physical Therapy*, *80*, 564–569.
12. Zemková, E., Vilman, T., Kováciková, Z., & Hamar, D. (2013). Reaction time in the agility test under simulated competitive and noncompetitive conditions. *The Journal of Strength & Conditioning Research*, *27*(12), 3445-3449.