Assessment of effects on Forehand and Backhand Clears in Badminton Responses to Upper Body Kettlebell and Swiss Ball Exercises

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Abstract: *The purpose of the research was to assess the effects incurred on forehand and backhand clears in Badminton responses to upper body Kettlebell and Swiss ball exercises.* To *achieve the purpose of the present study, thirty male intermediate level players have been randomly selected from the Coimbatore district badminton academy. The age of subjects ranged from 17 to 23 years. The subjects had the experience of at least one year in the academy practicing badminton were taken as subjects. Using the matching procedure, based on playing ability the subjects were divided into three equal groups of ten subjects each. Group-I (n=10) underwent upper body Kettlebell training, Group-II (n=10) underwent upper body Swiss ball training, and Group-III (n=10) acted as the control group. The experimental group participated in the Kettlebell and Swiss ball training respectively for 6 weeks, 3 days a week, one session per day, and each session lasted 90 minutes. The control group maintained their daily routine activities and no specific training was given. The badminton performance parameters namely forehand clear and backhand clear were selected as variables. The forehand clear was assessed by Poole forehand clear and backhand clear was assessed by Poole backhand clear test. The related group research design was used in this study. The data was collected at the beginning (pre-test) and end of the experimental period of 6 weeks (posttest). The collected data on selected badminton performance were statistically analyzed by using the statistical technique of analysis of covariance (ANCOVA). In performance-related variables, the six weeks of upper body Kettlebell training group showed better improvement in forehand and backhand clears when compared to the upper body Swiss ball training group.*

Keywords: Kettlebell, Swiss ball, forehand and backhand clears, badminton players.

INTRODUCTION

Badminton out of all racquet sports is the fastest, involving lightning reflexes, terrific body balance, excellent reach, quick recovery time and immense stamina to succeed. The sport requires a high level of skill to play at the elite level, though to be successful you need good reflexes and have to be lightning-quick and agile around the court. Badminton players require a variety of fitness capabilities to be excel in their sport. Aerobic fitness, flexibility, speed, balance, reaction time, agility, power, and strength are all components of fitness that can be developed with regular assessment and training.

The purpose of the forehand clear is used to force your opponent to the rear court. It can be played as an attacking shot or as a defensive shot. The attacking clear is hit faster and flatter into the rear corners. The defensive clear is hit much higher and despite giving your opponent time to get behind the shuttle – it also gives you more time to get back to a base position. The overhead clear is played with a throwing action. To execute the shot, turn sideways on with the non-racket foot forward. Prepare the racket by lining the racket head and the non-racket hand up, pointing towards the shuttle. Follow the line of the shuttle back with racket and hand until just before the shuttle is in hitting range. At this stage draw the racket back behind the shoulder and form a throwing position – not dissimilar to that of a javelin thrower.

As with the forehand clear, the purpose of this shot is to get the shuttle over your opponent's head and force them as close to the rear court as you can. A backhand clear is usually only played when a player is not in a position to play a forehand ('round the head') shot and as such, this is a defensive shot. This is one of the toughest shots to play in badminton. As the shuttle is struck behind the body the 'thumb' grip (often confusingly referred to as a backhand grip) should not be used. To enable the correct hitting action the thumb should be diagonal across the grip or placed on the 'bevel' of the grip.

If only a short unit is taught then the skills and strokes considered most important for the beginning player to know and use in a game would include the grips (forehand and backhand), footwork, high deep serve, short-low serve, forehand clear, backhand dear, and smash. Strokes to be added if time and. skill permit is the forehand drive, backhand drive, overhead drop shot, and net drop shot.

The invention provides a Kettlebell having a substantially hollow body and a curved handle, where the handle is integrally coupled to the body at two handle coupling locations proximate the top of the body. The handle defines a grip area in a location farthest from the body. The handle is tapered, with the widest part of the handle located proximate the handle coupling locations, and the narrowest part of the handle located in the grip area. The taper provides improved cross-sectional strength at the intersection of the handle and the body (**George, 2010).**

Swiss ball refers to an exercise ball usually made-up of soft PVC material measuring 35 to 85 centimeters, diameter filled with air. The air pressure is altered either by inflating or deflating the ball through the valve stem. Exercises using the Swiss ball differ from exercises using a bench because, a Swiss ball acts as a "bouncy" unstable support and therefore the trainee requires co-ordination and effort to keep away from either falling over or falling off the ball **(Swiss ball, 2014 & (Beardsley, C., & Contreras, B. (2014))**

The purpose of the study was to assess the effects incurred on forehand and backhand clears in Badminton responses to upper body Kettlebell and Swiss ball exercises. The objectives of the study were there would be a significant improvement in Badminton backhand clear and forehand clear due to the effect of upper body Kettlebell training and Swiss ball exercise training programs.

METHODS

Participants

To assess the influence of the training regimen totally (N=30) thirty male intermediate level players have been randomly selected from the Coimbatore district badminton academy. The age of subjects ranged from 17 to 23 years. The subjects had the experience of at least one year in the academy practicing badminton were taken as subjects. The subjects were divided into three equal groups of ten subjects each. Group-I (n=10) underwent upper body Kettlebell training, Group-II (n=10) underwent upper body Swiss ball training, and Group-III (n=10) acted as a control group.

Variables and assessment tools

The experimental group participated in the upper body Kettlebell and Swiss ball training respectively for 6 weeks, 3 days a week, one session per day, and each session lasted 90 minutes. The control group maintained their daily routine activities and no specific training was given. The badminton performance parameters namely forehand clear and backhand clear were selected as variables. The forehand clear was assessed by Poole forehand clear and backhand clear was assessed by Poole backhand clear test, the measuring was recorded as a score in numbers.

Design

The relative random group design was used and all the subjects were informed about the nature of the study and their consent was obtained to get their co-operation on till the end of the experiment and testing period. The data were collected first at the beginning (pre-test) and finally at the end of the experimental period of 6 weeks (posttest). The collected data from the three groups before and after the experimental treatments on selected performance-related variables were statistically analyzed by using the statistical technique of analysis of covariance (ANCOVA). Whenever the 'F' ratio for adjusted posttest means was found to be significant Scheffe's test was followed as a post hoc test to determine which of the paired means difference was significant.

Training program

The training program became lasted for 90 minutes for a session in the morning for three days per week for eight weeks period. These sixty minutes included 10 mint heat up, 10 mins cool down exercise. Every two weeks of training five percent of the intensity of load changed into increased from 65% to 75% of the workload. The load was fixed based on their maximum performance for swiss ball exercises and kettlebell exercises the 1 RM test was used to fix the intensity. Following upper body kettlebell and Swiss ball exercises were followed.

Table - 1

S.No	Upper body Kettle ball exercises (Group – I)	Upper body Swiss ball exercise (Group – II)
1	Single Arm Swing	Standing Ball Biceps Curl
2	Jerk Press	Ball Biceps Curl (on Knees, One-at-a-Time)
3	Jackknife Pull Over	Ball Triceps Extension
4	Close Chest Press (single arm)	Ball Triceps Extension – Standing
5	One Arm Close Row	Ball Wrist Curl
6	Acid Drop and Triceps Extension	Ball Chest Fly
7	Figure 8 Curl	Ball Push Up
8	Clean and Press	Ball Dumbbell Press – Incline

Rest between sets 30sec and rest between exercise 60-90sec.Three days in a week (Monday, Wednesday, and Friday.)

ANALYSIS OF DATA AND RESULTS OF THE STUDY
Table – 2

Analysis of covariance for the pre, post and adjusted post-tests data on forehand clear of experimental and Control groups (in points)

Test	UBKBT	UBSBT	Control group	SOV	SS	df	MS	F
Pre-test								
Mean	20.20	19.50	21.40	**BM**	18.47	2	9.23	0.76
				WG	326.50	27	12.09	
Post-test								
Mean	32.60	28.40	21.70	**BM**	604.47	2	302.23	34.45*
				WG	236.90	27	8.77	
Adjusted post-test								
Mean	32.62	28.50	21.57	**BM**	605.11	2	302.55	33.87*
				WG	232.24	26	8.93	

*Significant at 0.05 level of confidence.
(The table values required for significance at 0.05 level of confidence for 2 & 27 and 2 & 26 are 3.35 and 3.37 respectively).

Table - 2 shows that the pre-test mean values on forehand clear of upper body Kettlebell training group, upper body Swiss ball training group, and control group is 20.20, 19.50, and 21.40 respectively. The obtained 'F' ratio 0.76 for pre-test scores was less than the table value, 3.35 for degrees of freedom 2, and 27 required for significance at 0.05 level of confidence on forehand clear. The post-test mean values on forehand clear of upper body Kettlebell training group, upper body Swiss ball training group, and control are 32.60, 28.40, and 21.70 respectively. The obtained 'F' ratio 34.45 for post-test scores was greater than the table value 3.35 for degrees of freedom 2 and 27 required for significance at 0.05 level of confidence on forehand clear. The adjusted post-test means of forehand clear of Kettlebell training group, upper body Swiss ball training group, and control group are 32.62, 28.50, and 21.57. The obtained 'F' ratio of 33.87 for adjusted post-test means was greater than the table value of 3.37 for degrees of freedom 2 and 26 required for significance at 0.05 level of confidence on forehand clear. The result of the study indicates that there was a significant difference among the adjusted post-test means of on upper body Kettlebell training group, Swiss ball training group, and control on forehand clear.

Since the obtained 'F' ratio value was significant further to find out the paired mean difference, the Scheffe's test was employed and presented in the table – 3

Table – 3
The Scheffe's Test for The Difference Between Paired Means on Forehand Clear

UBKBT	UBSBT	Control group	MD	CI
32.62	_	21.57	11.05*	
32.62	28.50	_	4.12*	3.46
_	28.50	21.57	6.93*	

Significant at 0.05 level of confidence.

The table - 4 shows that the mean difference values between upper body Kettlebell training & control group, upper body Kettlebell training & upper body Swiss ball training and upper body Swiss ball training & control group are 11.05, 4.12 and 6.93 respectively which are greater than the confidence interval value 3.46 at 0.05 level of confidence. The results of the study showed that there was a significant difference between upper body Kettlebell training & control group, upper body Kettlebell training & upper body Swiss ball training and upper body Swiss ball training & control group on forehand clear.
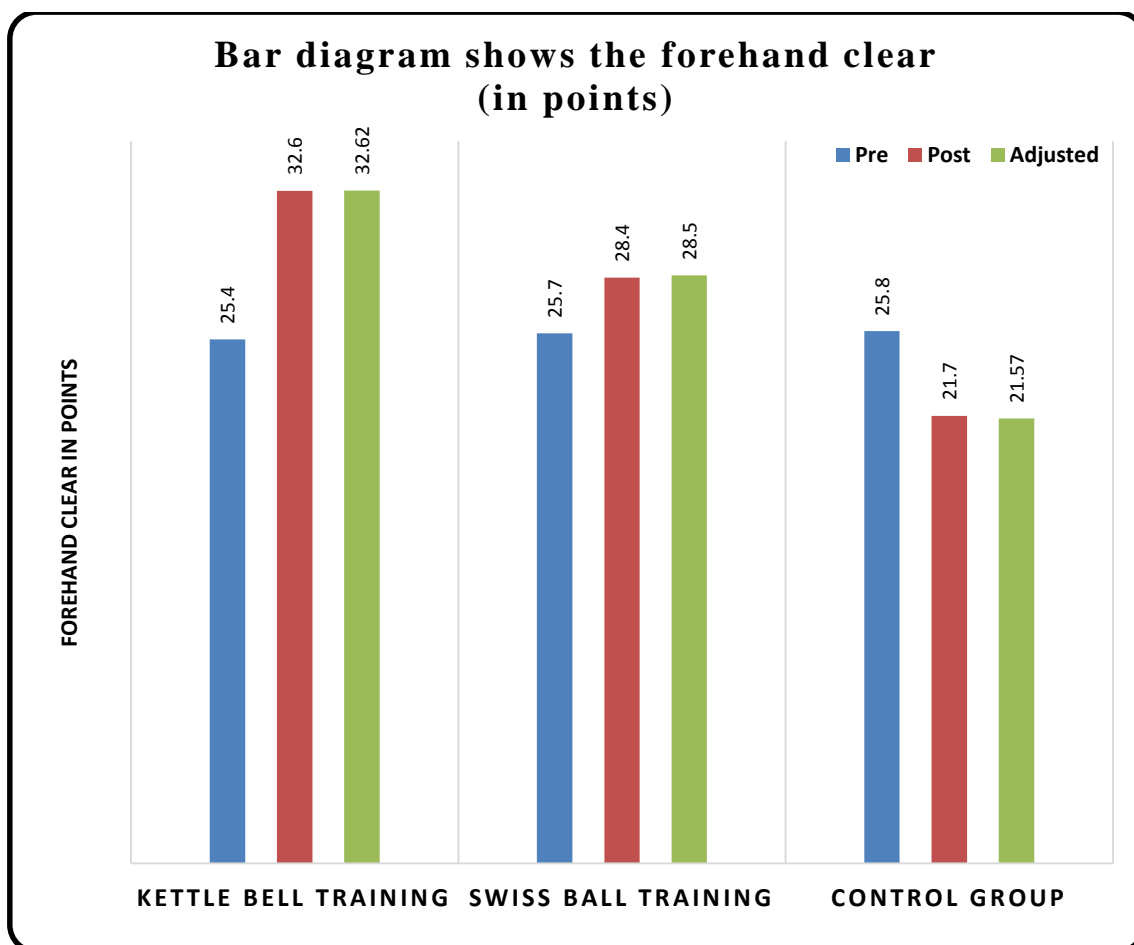

Diagram – 1

TABLE – 4
ANALYSIS OF COVARIANCE FOR THE PRE, POST AND ADJUSTED POST-TESTS DATA ON BACKHAND CLEAR EXPERIMENTAL AND CONTROL GROUPS (IN POINTS)

Test	UBKBT	UBSBT	Control group	SOV	SS	df	MS	F
Pre-test								
Mean	25.40	25.70	25.80	B.M	0.87	2	0.43	0.24
SD (±)	1.07	1.49	1.40	W.G	48.10	27	1.78	
Post-test								
Mean	34.80	31.10	25.60	B.M	428.60	2	214.30	21.83*
SD (±)	3.82	3.54	1.51	W.G	264.90	27	9.81	

Adjusted post-test								
Mean	34.92	31.07	25.52	**B.M**	440.01	2	220.01	22.64*
				W.G	252.62	26	9.72	

Significant at 0.05 level of confidence.
(The table values required for significance at 0.05 level of confidence for 2 & 27 and 2 & 26 are 3.35 and 3.37 respectively).

     The table - 4 describes that the pre-test mean values on backhand clear of upper body Kettlebell training group, upper body Swiss ball training group and control group are 25.40, 25.70 and 25.80 respectively. The obtained 'F' ratio 0.24 for pre-test scores was less than the table value, 3.35 for degrees of freedom 2 and 27 required for significance at 0.05 level of confidence on backhand clear. The post-test mean values on backhand clear of upper body Kettlebell training group, upper body Swiss ball training group and control are 34.80, 31.10 and 25.60 respectively. The obtained 'F' ratio 21.83 for post-test scores was greater than the table value 3.35 for degrees of freedom 2 and 27 required for significance at 0.05 level of confidence on back hand clear. The adjusted post-test means of backhand clear of upper body Kettlebell training group, upper body Swiss ball training group and control group are 34.92, 31.07 and 25.52. The obtained 'F' ratio of 22.64 for adjusted post-test means was greater than the table value of 3.37 for degrees of freedom 2 and 26 required for significance at 0.05 level of confidence on backhand clear. The result of the study indicates that there was a significant difference among the adjusted post-test means of on upper body Kettlebell training group, upper body Swiss ball training group and control on backhand clear.

     Since the obtained 'F' ratio value was significant further to find out the paired mean difference, the Scheffe's test was employed and presented in table – 5

TABLE – 5
THE SCHEFFE'S TEST FOR THE DIFFERENCE BETWEEN PAIRED MEANS ON BACKHAND CLEAR

UBKBT	UBSBT	Control group	MD	CI
34.92	_	25.52	9.40*	
34.92	31.07	_	3.85*	3.60
_	31.07	25.52	5.55*	

Significant at 0.05 level of confidence.

     The table - 5 describes that the mean difference values between upper body Kettle bell training & control group, upper body Kettle bell training & upper body Swiss ball training and upper body Swiss ball training & control group are 9.40, 3.85 and 5.55 respectively which are greater than the confidence interval value 3.60 at 0.05 level of confidence. The results of the study described that there was a significant difference between upper body Kettlebell training & control group, upper body Kettlebell training & upper body Swiss ball training and upper body Swiss ball training & control group on backhand clear.
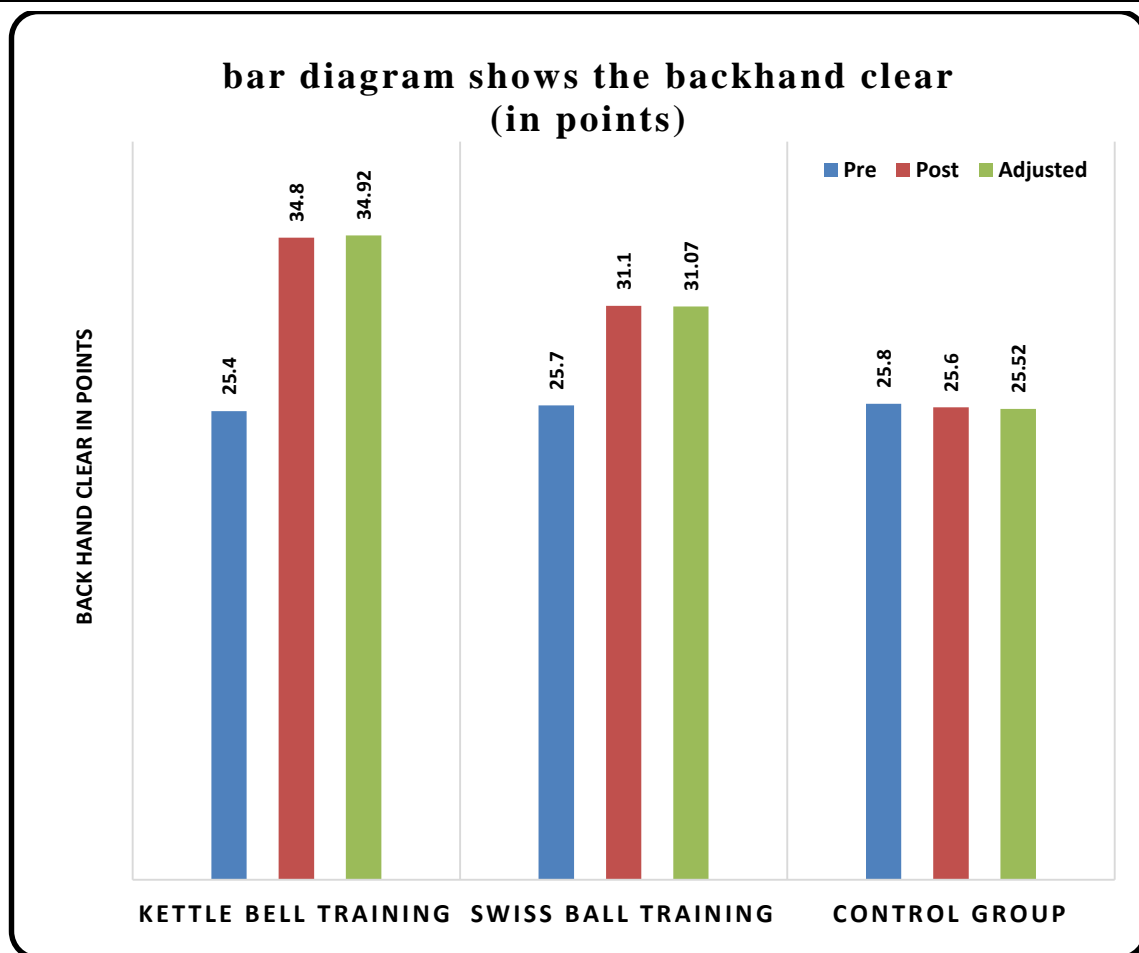
Diagram – 2

DISCUSSION ON FINDINGS

The results of the study indicate that the experimental groups namely upper body Kettlebell training and upper body Swiss ball training groups had shown significant improvement in all selected performance variables among the Badminton players. The control group Badminton player had not shown significant changes in any of the selected variables.

The results of the study indicate that the Kettlebell training group had shown significant improvement in Badminton performance-related variables such as forehand clear and backhand clear among intermediate level Badminton players. **Lake,** *et. al.,* **(2012)** detailing the influence of Kettlebell swing stimulus that is sufficient to increase both maximum strengths with explosive execution, which offers a useful alternative to strength and conditioning professionals seeking variety for their athletes. **Nirendan and Murugavel (2019)** indicated the effects of low intensity sports specific resistance training with yoga positively improved the range of motion of joints of badminton players, which improves the mobility of joints more strength with explosive execution of prolonged rallies in Badminton.

Erbes (2012) and Beltz et al., (2013) also evaluated the influence of dynamic balance with muscular strength and endurance provided by kettlebell exercises. Badminton players initiate a starting step with the dominant foot towards the forehand or backhand side steps, followed by an intermediate step with the non-dominant foot to hit the shuttlecock (Brahms, 2014).

CONCLUSIONS

In concern with the obtained results of the study, the six weeks of upper body Kettlebell training group showed better improvement in forehand and backhand clears when compared to the upper body Swiss ball training group. The outcomes of the results of the present study delivered that the influence of the upper body kettlebell and Swiss ball exercise is recommended to incorporate into their regular badminton conditioning. Further, the combination of these two different exercises is needed to get the balanced and dynamic strength of the badminton players. The research outcome also deals to expect more desirable changes when the training period should be long and combined.

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