CHAPTER - IV

RESULTS AND DISCUSSIONS

4.1 OVERVIEW

This chapter deals with the analysis of data collected from the subjects under the study. The purpose of this study was to find out the combined effect of circuit, resistance training and combined training on physical, physiological and performance variables of football players. For the study football players were selected as subjects. Their age was ranging from 18 to 20 years. The subjects were selected into four groups. Experimental group I (circuit training), experimental group II (resistance training), experimental group III (combined training (circuit & resistance training), and control group (no training). The subjects were analyzed with the differences in the measures of selected physical variables, physiological variables and performance variables such as speed, endurance, agility, strength, flexibility, Vo2 max, resting heart rate, dribbling, shooting, passing and playing performance in relation to pre and post test and adjusted post test scores were presented in this chapter.

The subjects are selected randomly but the groups were not equated in relation to factors to be examined hence the difference between the means and four groups pre and post test were taken into an account during the analysis of covariance, where the final means were adjusted for difference in the initial means and the adjusted means were tested for significance difference. When the adjusted post test means were significant the Scheffe's post hoc test was administered to find out the paired means significant differences **(clarke and Clarke 1972)**

4.2 TEST OF SIGNIFICANCE

There could the critical portion of the thesis in arriving at the conclusion by examining the hypothesis. This procedure of testing the hypothesis was done by accepting the research hypothesis or rejecting the same in accordance with the results in relation to the level of confidence fixed by 0.05 level of confidence in the difference between the pre and post test scores.

4.3. LEVEL OF SIGNIFICANCE

The probability level below which the hypothesis is rejected is termed as the level of significance. The 'F' ratio obtained by analysis of covariance were compared at 0.05 level of significance. In analysis of covariance of 'F' ratio of 2.77 is needed for significance at the 0.05 level of confidence for the degrees freedom 2 and 56.

4.4 COMPUTATION OF ANALYSIS OF COVARIANCE AND POST HOC TEST

The following tables illustrate the statistical result on the combined effect of circuit training , resistance training and combined training on speed, endurance, agility, strength, flexibility, Vo2 max, resting heart rate, dribbling, shooting, passing and playing performance among football players. The ordered adjusted means and differences between the means of the groups under study were given in the following tables.

4.5. RESULTS ON SPEED

The analysis of covariance for the pre, post test and adjusted post test data on speed of the results on the combined effect of circuit and resistance training and combined group and control group have been presented in the table VI.

TABLE VI

ANALYSIS OF COVARIANCE OF PRE – TEST POST AND ADJUSTED POST-TEST ON SPEED OF EXPERIMENTAL AND CONTROL GROUPS

(Scores in Seconds)

	EX.GR.I (Circuit training) group	EX.GR. II. (Resistance training) group	EX.GR. III. (Combined training) group	Control Group	SV	SS	df	MS	F
Pre Test Mean	6.55	6.47	6.35	6.56	B	0.43	2.00	0.14	2.25
					W	18.22	56.00	0.33	
Post Test Mean	6.27	6.22	5.99	6.55	B	2.41	2.00	1.21	3.53*
					W	19.17	56.00	0.34	
Adjusted Post Test Mean	4.67	4.71	4.59	4.95	B	1.06	2.00	0.53	12.50*
					W	2.32	55.00	0.04	
Mean Diff	0.28	0.24	0.36	0.01					

The table value required for significance at 0.05 level of confidence with degrees of freedom 3, 56 and 3, 55 is 2.77.

Table VI shows that the pre test mean scores of speed of circuit training was 6.55 seconds, resistance training was 6.47 seconds, combined circuit and resistance training was 6.35 seconds and control group was 6.56 seconds. The post test means showed differences due to circuit training group, resistance training group, combined circuit and resistance training and control group mean values recorded were 6.27,6.22,5.99 and 6.55 seconds respectively.

The obtained F value on pre test scores 2.25 was lesser than the required table value of 2.77 to be in significant at 0.05 level. It proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 3.53 was greater than the table value of 2.77. It proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean were calculated and subjected to statistical treatment. The obtained F value of 12.50 was greater than the table value of 2.77. It proved that there was a significant difference among the means due to the experimental training on speed.

The mean gain of experimental groups I, II, III and control group were 0.28, 0.24, 0.36 and 0.01 respectively.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table VII.

TABLE - VII
SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES ON SPEED
(Scores in seconds)

Experimental Group – I (Circuit Training)	Experimental Group – II (Resistance Training)	Experimental Group – III (Combined Training)	Control Group	Mean Difference	C.I
4.67	4.71	-	-	0.04	0.19
4.67	-	-	4.95	0.27*	0.19
4.67	-	4.59	-	0.09	0.19
-	4.71	-	4.95	0.24*	0.19
-	-	4.59	4.95	0.36*	0.19
-	4.71	4.59	-	0.12	0.19

* Significant

Table - VII shows that adjusted post test mean difference of circuit training and control group, resistance training and control group, combined training and control group were 0.27, 0.24 and 0.36 respectively. They were greater than the confidence interval value 0.05 level which indicates that there was significant among between of circuit training and control group, resistance training and combined training, combined training and control group on speed.

It also shows that the adjusted post test mean difference of circuit training and resistance training, circuit training and combined training and resistance training and combined training were 0.04, 0.09 and 0.12 respectively. That they were less than the confidence interval values 0.19 at 0.05 level which indicates that there was no significant difference among circuit training and resistance training, circuit training and combined training and resistance training and control group on speed.

The adjusted post test mean values of circuit training, resistance training, combined circuit and resistance training and control group on speed are graphically presented in figure 7.

FIGURE – 7

BAR DIAGRAM ON PRE, POST AND ORDERED ADJUSTED MEANS OF SPEED

(Scores in Seconds)
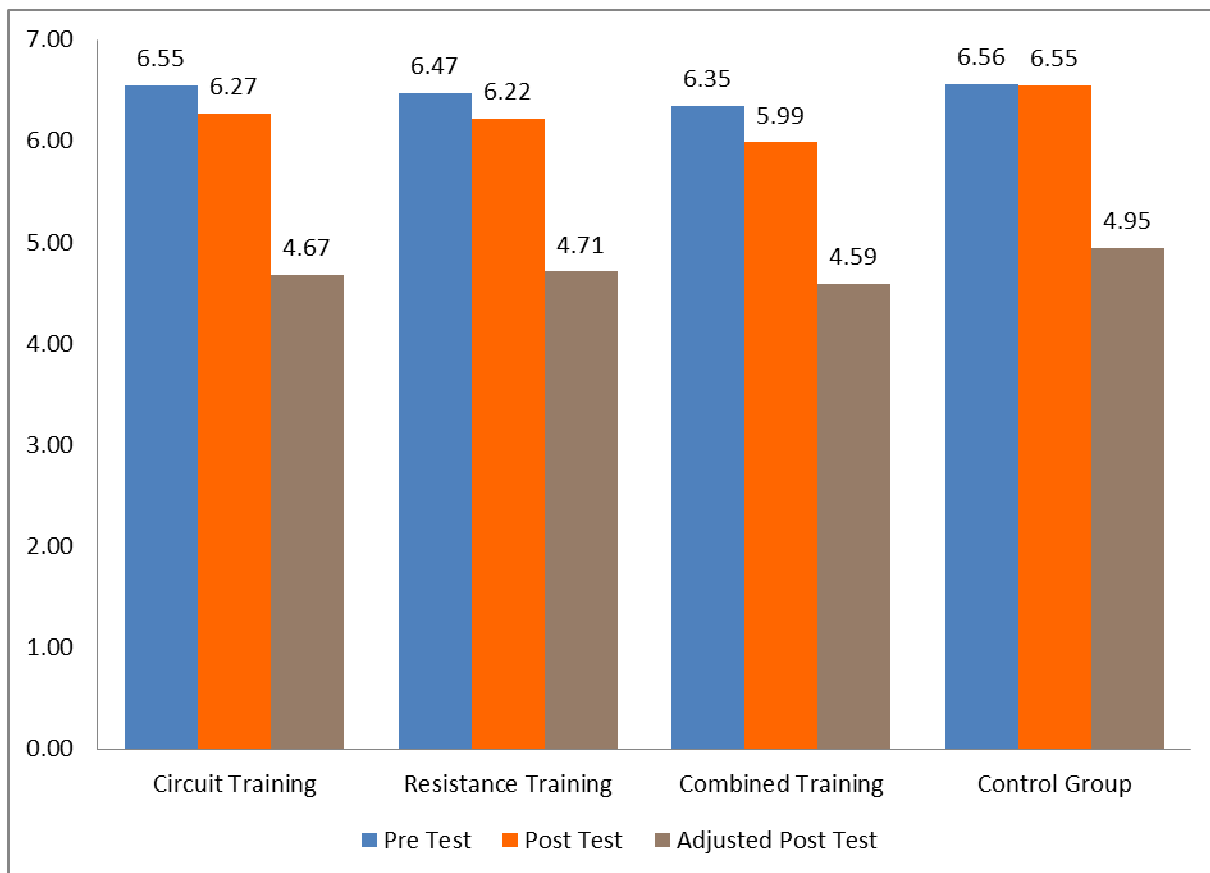
4.5.1 DISCUSSIONS ON THE FINDINGS OF SPEED

The results presented in Table VII showed that the obtained adjusted means on speed among circuit training group was 4.67, followed by resistance training group mean value of 4.71, followed by combined circuit and resistance training mean value of 4.59 and control group mean value 4.95. The differences among pre test, post test and adjusted mean scores of the subjects were statistically treated and using ANCOVA the obtained F values were 2.25,3.53 and 12.50 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table value of 2.77.

The post hoc test analysis through Scheffe's Confidence test proved that due to circuit training, resistance training, combined circuit and resistance training groups improved speed than the control group and the differences were significant at 0.05 level. Further, the post hoc test analysis shows that there was significant difference between the experimental groups, clearly indicating that combined circuit and resistance training group was better than the circuit training, resistance training in improving the speed of the men football players.

This result was in conformity with the findings of the studies undertaken by Ratamess others (2007) conducted the ten weeks of resistance and combined plyometric training improved has significantly improved speed.

4.6 RESULTS ON ENDURANCE

The analysis of covariance for the pre, post and adjusted post test data on endurance of the results on the circuit training, resistance training, combined training and control group have been presented in the table VIII.

TABLE- VIII

ANALYSIS OF COVARIANCE OF PRE – TEST POST AND ADJUSTED POST-TEST ON ENDURANCE OF EXPERIMENTAL AND CONTROL GROUPS
(Scores in Meters)

	EX.GR.I (Circuit training) group	EX.GR. II. (Resistance training) group	EX.GR.III. (Combined training) group	Control Group	SV	SS	df	MS	F
Pre Test Mean	2043.33	2106.67	2011.67	2059.00	B	70488.33	2.00	23496.11	2.16
					W	610260.00	56.00	10897.50	
Post Test Mean	2323.33	2436.67	2400.33	2167.67	B	640576.67	2.00	320288.33	25.34*
					W	707933.33	56.00	12641.67	
Adjusted Post Test Mean	2079.33	2161.19	2172.06	1915.87	B	629734.43	2.00	314867.22	31.08*
					W	557269.04	55.00	10132.16	
Mean Diff	280.00	330.00	388.67	108.67					

The table value required for significance at 0.05 level of confidence with degrees of freedom 3, 56 and 3, 55 is 2.77.

Table VIII shows that the pre test mean scores of endurance of circuit training was 2043.33 meters, resistance training was 2106.67 meters, combined circuit and resistance training was 2011.67 meters and control group was 2059.00 meters. The post test means showed differences due to circuit training group, resistance training group, combined circuit and resistance training and control group mean values recorded were 2323.33, 2436.67, 2400.33 and 2167.67 meters respectively.

The obtained F value on pre test scores 2.16 was lesser than the required table value of 2.77 to be in significant at 0.05 level. It proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 25.34 was greater than the table value of 2.77. It proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean were calculated and subjected to statistical treatment. The obtained F value of 31.08 was greater than the table value of 2.77. It proved that there was a significant difference among the means due to the experimental training on endurance.

The mean gain of experimental groups I, II, III and control group were 280,330,388.67and 108.67 respectively.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table IX.

TABLE - IX
SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES ON ENDURANCE
(Scores in Meters)

| Experimental Group – I (Circuit Training)	Experimental Group –II (Resistance Training)	Experimental Group – III (Combined Training)	Control Group	Mean difference	Required C.I
2079.33	2161.19	-	-	81.86	93.42
2079.33	-	-	1915.87	163.45*	93.42
2079.33	-	2172	-	92.73	93.42
-	2161.19	-	1915.87	245.32*	93.42
-	-	2172.06	1915.87	256.19*	93.42
-	2161.19	2172.06	-	10.87	93.42

* Significant

Table - IX shows that adjusted post test mean difference of circuit training and control group, resistance training and control group and combined training and control group were 163.45, 245.32 and 256.19 respectively. They were greater than the confidence interval value 0.05 level which indicates that there was significant among between of circuit training and control group, resistance training and control group and combined training and control group on endurance.

It also shows that the adjusted post test mean difference of circuit training and resistance training, circuit training and combined training group, resistance training and combined training were 81.86, 92.73 and10.87 respectively. That they were less than the confidence interval values 93.42 at 0.05 level which indicates that there was no significant difference among circuit training and resistance training, circuit training and combined training group, resistance training and combined training on endurance.

The adjusted post test mean values of circuit training, resistance training, combined circuit and resistance training and control group on endurance are graphically presented in figure 8.

FIGURE - 8

BAR DIAGRAM ON PRE, POST AND ORDERED ADJUSTED

MEANS OF ENDURANCE

(Scores in Meters)
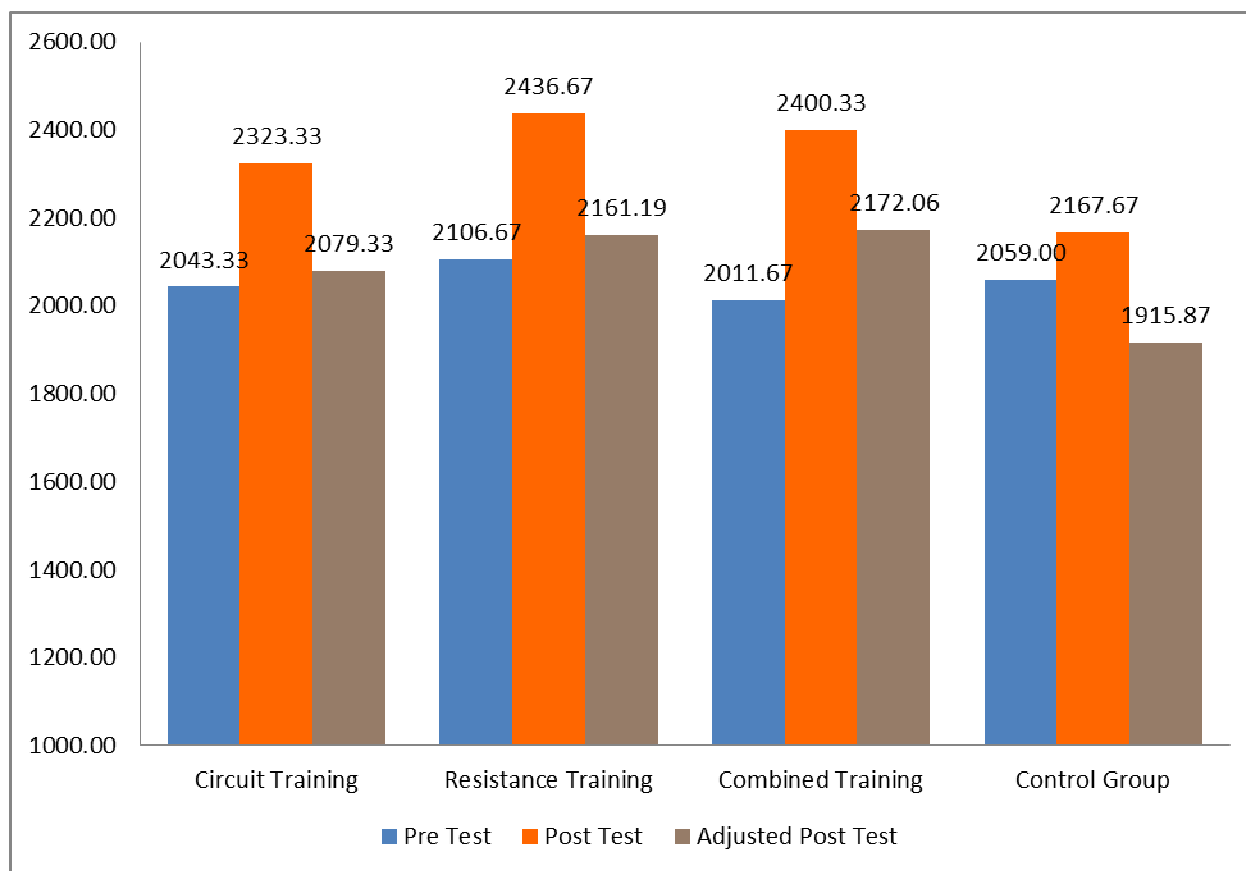
4.6.1 DISCUSSIONS ON THE FINDINGS OF ENDURANCE

The results presented in Table IX showed that the obtained adjusted means on endurance among circuit training group was 2079.33, followed by resistance training group mean value of 2161.19, followed by combined circuit and resistance training mean value of 2172.06 and control group mean value 1915.87. The differences among pre test, post test and adjusted mean scores of the subjects were statistically treated and using ANCOVA the obtained F values were 2.16, 25.34 and 31.08 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table value of 2.77.

The post hoc test analysis through Scheffe's Confidence test proved that due to circuit training, resistance training, combined circuit and resistance training groups improved endurance than the control group and the differences were significant at 0.05 level. Further, the post hoc test analysis shows that there was significant difference between the experimental groups, clearly indicating that combined circuit and resistance training groups was better than the circuit training, resistance training in improving the endurance of the men football players.

This result was in conformity with the findings of the studies undertaken by **Barfield J.P, et.al.(2007)** conducted the index evaluation improved has significantly improved endurance.

4.7 RESULTS ON AGILITY

The analysis of covariance for the pre, post test and adjusted post test data on agility of the results on the combined effect of circuit, resistance, and combined training group and control group have been presented in the table X.

TABLE X
ANALYSIS OF COVARIANCE OF PRE – TEST POST AND ADJUSTED POST-TEST
ON AGILITY OF EXPERIMENTAL AND CONTROL GROUPS
(Scores in seconds)

	EX.GR.I (Circuit training) group	EX.GR. II. (Resistance training) group	EX.GR.III. (Combined training) group	Control Group	SV	SS	df	MS	F
Pre Test Mean	10.21	10.13	10.36	10.12	B	0.573	3	0.19	1.13
					W	9.450	56	0.17	
Post Test Mean	9.31	9.23	8.99	10.74	B	28.3169	3	9.44	40.93*
					W	12.915	56	0.23	
Adjusted Post Test Mean	9.31	9.26	8.93	10.77	B	29.550	3	9.85	47.12*
					W	11.497	55	0.20	
Mean Diff	0.90	0.90	1.37	0.62					

The table value required for significance at 0.05 level of confidence with degrees of freedom 3, 56 and 3, 55 is 2.77.

Table X shows that the pre test mean scores of agility of circuit training was 10.21 seconds, resistance training was 10.13 seconds, combined circuit and resistance training was 10.36 seconds and control group was 10.12 seconds. The post test means showed differences due to circuit training

group, resistance training group, combined circuit and resistance training and control group mean values recorded were 9.31, 9.23, 8.99 and 10.74 seconds respectively.

The obtained F value on pre test scores 1.13 was lesser than the required table value of 2.77 to be significant at 0.05 level. It proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 40.93 was greater than the table value of 2.77. The proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean were calculated and subjected to statistical treatment. The obtained F value of 47.12 was greater than the table value of 2.77. This proved that there was a significant difference among the means due to the experimental training on agility.

The mean gain of experimental groups I, II, III and control group were 0.90, 0.90, 1.7 and 0.62 respectively.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table XI.

TABLE - XI

SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES ON AGILITY
(Scores in Seconds)

| Experimental Group – I (Circuit Training)	Experimental Group –II (Resistance Training)	Experimental Group – III (Combined Training)	Control Group	Mean difference	Required C.I
9.31	9.26	-	-	0.05	0.59
9.31	-	8.93	-	0.37	0.59
9.31	-	-	10.77	1.46*	0.59
-	9.26	8.93	-	0.32	0.59
-	9.26	-	10.77	1.51*	0.59
-	-	8.93	10.77	1.84*	0.59

* Significantaining

Table - XI shows that adjusted post test mean difference of circuit training and control group, resistance training and control group and combined training and control group were 1.46, 1.51 and 1.84 respectively. They were greater than the confidence interval value 0.05 level which indicates that there was significant among between of circuit training and control group, resistance training and control group and combined training and control group on agility.

It also shows that the adjusted post test mean difference of circuit training and resistance training, circuit training and combined training and resistance training and combined training group were 0.05, 0.37 and 0.32 respectively. That they were less than the confidence interval values 0.59 at 0.05 level which indicates that there was no significant difference among circuit training and resistance training, circuit training and combined training and resistance training and combined training group on agility.

The adjusted post test mean values of circuit training, resistance training, combined circuit and resistance training and control group on agility are graphically presented in figure 9.

FIGURE - 9

BAR DIAGRAM ON PRE, POST AND ORDERED ADJUSTED MEANS OF AGILITY

(Scores in Seconds)
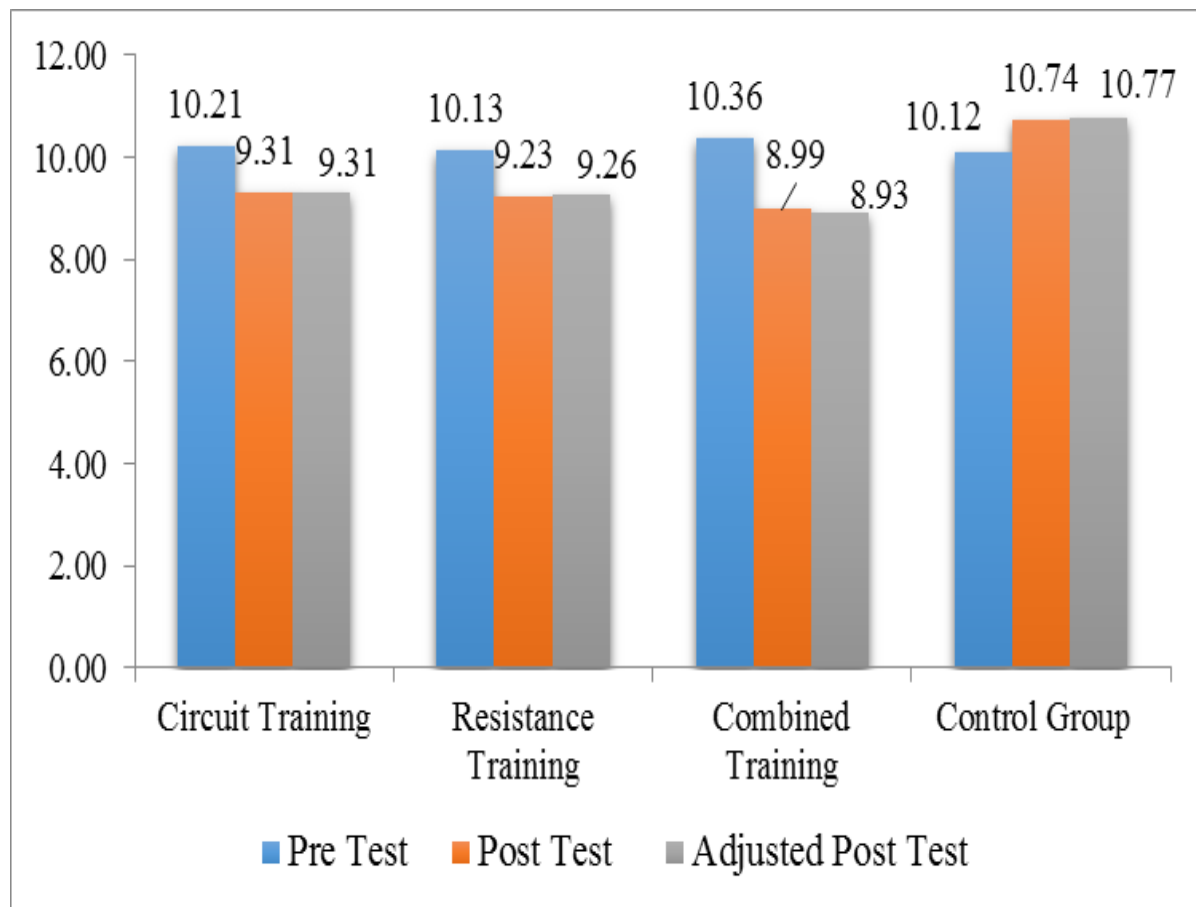
4.7,1 DISCUSSIONS ON THE FINDINGS OF AGILITY

The results presented in Table XI showed that the obtained adjusted means on agility among circuit training group was 9.31, followed by resistance training group mean value of 9.26, followed by combined circuit and resistance training mean value of 8.93 and control group mean value 10.77. The differences among pre test, post test and adjusted mean scores of the subjects were statistically treated and using ANCOVA the obtained F values were 1.13, 40.98 and 47.12 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table value of 2.77.

The post hoc test analysis through Scheffe's Confidence test proved that due to circuit training, resistance training, combined circuit and resistance training groups improved agility than the control group and the differences were significant at 0.05 level. Further, the post hoc test analysis shows that there was significant difference between the experimental groups, clearly indicating that combined circuit and resistance training groups was better than the circuit training, resistance training in improving the agility of the men football players.

This result was in conformity with the findings of the studies undertaken by Henry and others (2011) conducted the light based reactive agility test improved has significantly improved agility for football players.

4.8 RESULTS ON STRENGTH

The analysis of covariance for the pre, post test and adjusted post test data on strength of the results on the combined effect of circuit and resistance training and combined group and control group have been presented in the table XII.

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TABLE XII

ANALYSIS OF COVARIANCE OF PRE – TEST POST AND ADJUSTED POST-TEST ON STRENGTH OF EXPERIMENTAL AND CONTROL GROUPS
(Scores in counts)

</div>

	EX.GR.I (Circuit training) group	EX.GR. II. (Resistance training) group	EX.GR.III (Combined training) group	Control Group	SV	SS	df	MS	F
Pre Test Mean	12.60	12.53	12.47	11.67	B	8.583	3	2.86	1.14
					W	140.40	56	2.51	
Post Test Mean	15.07	15.60	16.47	12.07	B	164.40	3	54.80	7.66*
					W	400.56	56	7.153	
Adjusted Post Test Mean	14.99	15.54	16.42	12.25	B	139.04	3	46.35	10.89*
					W	233.99	55	4.254	
Mean Diff	2.47	3.07	4.00	0.40					

The table value required for significance at 0.05 level of confidence with degrees of freedom 3, 56 and 3, 55 is 2.77.

Table XII shows that the pre test mean scores of strength of circuit training was 12.60, resistance training was 12.53, combined circuit and resistance training was 12.47 and control group was 11.67. The post test means showed differences due to circuit training group, resistance training

group, combined circuit and resistance training and control group mean values recorded were 15.07, 15.60, 16.47 and 12.07 respectively.

The obtained F value on pre test scores 1.14 was lesser than the required table value of 2.77 to be significant at 0.05 level. It proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 7.66 was greater than the table value of 2.77. The proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean were calculated and subjected to statistical treatment. The obtained F value of 10.89 was greater than the table value of 2.77. This proved that there was a significant difference among the means due to the experimental training on strength.

The mean gain of experimental groups I, II, III and control group were 2.47, 3.07, 4 and 0.40 respectively.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table XIII.

TABLE - XIII
SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES ON STRENGTH

| Experimental Group – I (Circuit Training)	Experimental Group – II (Resistance Training)	Experimental Group – III (Combined training)	Control Group	Mean difference	CI
14.99	15.54	-	-	0.55	2.64
14.99	-	16.42	-	1.44	2.64
14.99	-	-	12.25	2.74*	2.64
-	15.54	16.42	-	0.89	2.64
-	15.54	-	12.25	3.29*	2.64
-	-	16.42	12.25	4.17*	2.64

* Significant

Table - XIII shows that adjusted post test mean difference of circuit training and control group, resistance training and control group and combined training and control group were 2.74, 3.29 and 4.17 respectively. They were greater than the confidence interval value 0.05 level which indicates that there was significant among between of circuit training and control group, resistance training and control group and combined training and control group on strength.

It also shows that the adjusted post test mean difference of circuit training and resistance training, circuit training and combined training and resistance training and combined training group were 0.55, 1.44 and 0.89 respectively. That they were less than the confidence interval values 2.64 at 0.05 level which indicates that there was no significant difference among circuit training and resistance training, circuit training and combined training and resistance training and combined training group on strength.

The adjusted post test mean values of circuit training, resistance training, combined circuit and resistance training and control group on strength are graphically presented in figure 10.

FIGURE - 10

BAR DIAGRAM ON PRE, POST AND ORDERED ADJUSTED MEANS OF STRENGTH
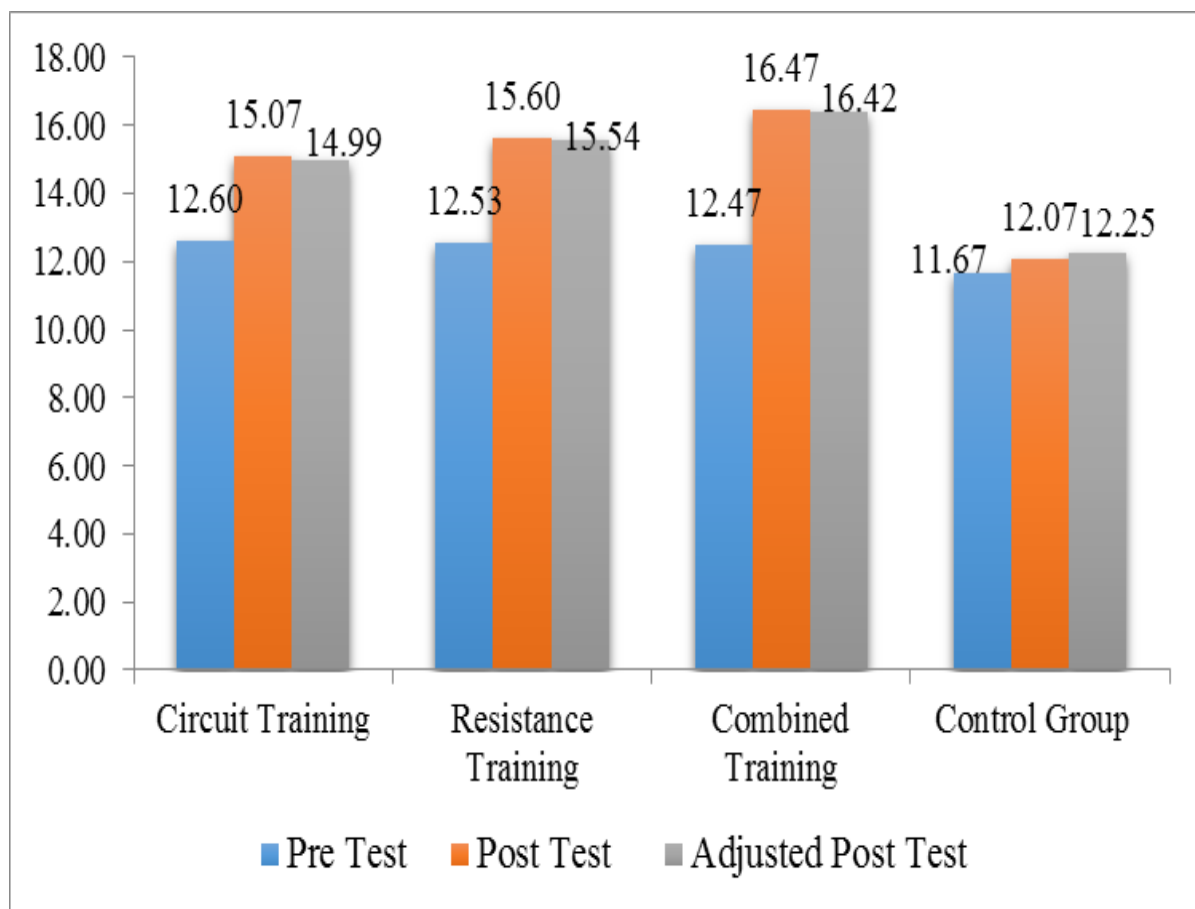
4.8.1 DISCUSSIONS ON THE FINDINGS OF STRENGTH

The results presented in Table XIII showed that the obtained adjusted means on strength among circuit training group was 14.99, followed by resistance training group mean value of 15.54, followed by combined circuit and resistance training mean value of 16.42 and control group mean value 12.25. The differences among pre test, post test and adjusted mean scores of the subjects were statistically treated and using ANCOVA the obtained F values were 1.14, 7.66 and 10.89 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table value of 2.77.

The post hoc test analysis through Scheffe's Confidence test proved that due to circuit training, resistance training, combined circuit and resistance training groups improved strength than the control group and the differences were significant at 0.05 level. Further, the post hoc test analysis shows that there was significant difference between the experimental groups, clearly indicating that combined circuit and resistance training groups was better than the circuit training, resistance training in improving the strength of the men football players.

This result was in conformity with the findings of the studies undertaken by Marques and others (2008) conducted the 12 week training well designed resistance and plyometric training has significantly improved strength for football players.

4.9 RESULTS ON FLEXIBILITY

The analysis of covariance for the pre, post test and adjusted post test data on flexibility of the results on the combined effect of circuit and resistance training and combined group and control group have been presented in the table XIV.

TABLE- XIV

ANALYSIS OF COVARIANCE OF PRE TEST POST AND ADJUSTED POST-TEST ON FLEXIBILITY OF EXPERIMENTAL AND CONTROL GROUPS
(Scores in centimeters)

	EX.GR.I (Circuit training group	EX.GR. II. (Resistance training) group	EX.GR.III (Combined training) group	Control Group	SV	SS	df	MS	F
Pre Test Mean	20.33	21.87	21.27	21.27	B	18.05	3	6.02	1.76
					W	190.93	56	3.41	
Post Test Mean	25.13	24.80	26.00	21.07	B	214.18	3	71.39	16.31*
					W	245.06	56	4.376	
Adjusted Post Test Mean	25.93	24.16	25.92	20.99	B	241.04	3	80.35	56.74*
					W	77.87	55	1.416	
Mean Diff	4.80	2.93	4.73	0.20					

The table value required for significance at 0.05 level of confidence with degrees of freedom 3, 56 and 3, 55 is 2.77.

Table XIV shows that the pre test mean scores of flexibility of circuit training was 20.33, resistance training was 21.87, combined circuit and resistance training was 21.27 and control group was 21.27. The post test means showed differences due to circuit training group, resistance training group, combined circuit and resistance training and control group mean values recorded were 25.13, 24.80, 26 and 21.07 respectively.

The obtained F value on pre test scores 1.76 was lesser than the required table value of 2.77 to be significant at 0.05 level. It proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 16.31 was greater than the table value of 2.77. The proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean were calculated and subjected to statistical treatment. The obtained F value of 56.74 was greater than the table value of 2.77. This proved that there was a significant difference among the means due to the experimental training on flexibility.

The mean gain of experimental groups I, II, III and control group were 4.80, 2.93, 4.73 and 0.20 respectively.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table XV.

TABLE – XV

SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES ON FLEXIBILITY

| Experimental Group – I (Circuit Training)	Experimental Group – II (Resistance Training)	Experimental Group – III (Combined training)	Control Group	Mean difference	CI
25.93	24.16	-	-	1.77*	1.52
25.93	-	25.92	-	0.01	1.52
25.93	-	-	20.99	4.94*	1.52
-	24.16	25.92	-	1.76*	1.52
-	24.16	-	20.99	3.17*	1.52
-	-	25.92	20.99	4.93*	1.52

* Significant

Table – XV shows that adjusted post test mean difference of circuit training and resistance training, circuit training and control group, resistance training and combined training, resistance training and control group and combined training and control group were 1.77, 4.94, 1.76, 3.17 and 4.93 respectively. They were greater than the confidence interval value 0.05 level which indicates that there was significant among between of circuit training and resistance training, circuit training and control group, resistance training and combined training, resistance training and control group and combined training and control group on flexibility.

It also shows that the adjusted post test mean difference of circuit training combined training group were 0.01 respectively. That they were less than the confidence interval values 1.52 at 0.05 level which indicates that there was no significant difference circuit training combined training group on flexibility.

The adjusted post test mean values of circuit training, resistance training, combined circuit and resistance training and control group on flexibility are graphically presented in figure 11.

FIGURE - 11

BAR DIAGRAM ON PRE, POST AND ORDERED ADJUSTED MEANS OF FLEXIBILITY
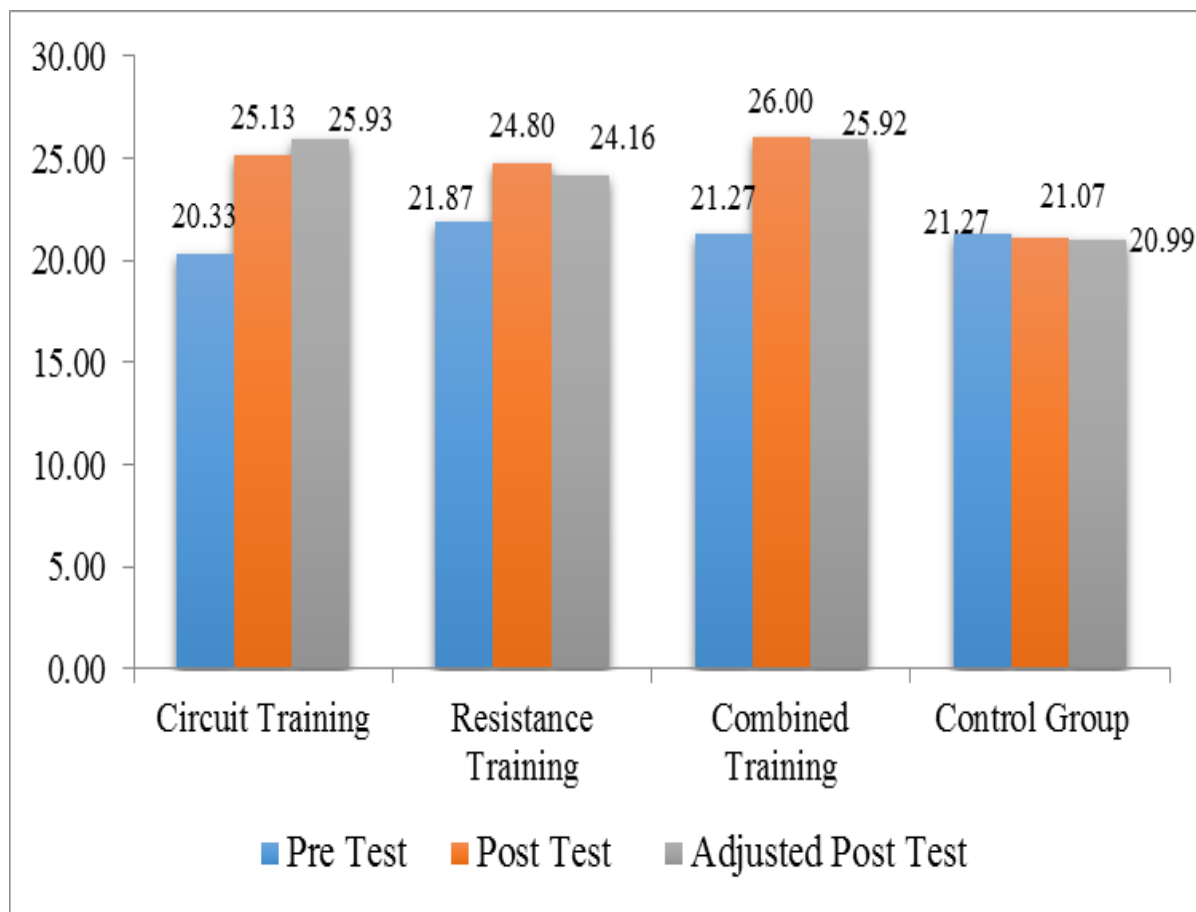
4.9.1 DISCUSSIONS ON THE FINDINGS OF FLEXIBILITY

The results presented in Table XV showed that the obtained adjusted means on flexibility among circuit training group was 25.93, followed by resistance training group mean value of 24.16, followed by combined circuit and resistance training mean value of 25.92 and control group mean value 20.99. The differences among pre test, post test and adjusted mean scores of the subjects were statistically treated and using ANCOVA the obtained F values were 1.76, 16.31 and 56.74 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table value of 2.77.

The post hoc test analysis through Scheffe's Confidence test proved that due to circuit training, resistance training, combined circuit and resistance training groups improved flexibility than the control group and the differences were significant at 0.05 level. Further, the post hoc test analysis shows that there was significant difference between the experimental groups, clearly indicating that combined circuit and resistance training groups was better than the circuit training, resistance training in improving the flexibility of the men football players.

This result was in conformity with the findings of the studies undertaken by Rinne and others (2001) conducted the basic motor skills has significantly improved flexibility or football players.

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4.10 RESULTS ON VO₂ MAX

The analysis of covariance for the pre, post test and adjusted post test data on VO2 max of the results on the combined effect of circuit and resistance training and combined group and control group have been presented in the table XVI.

TABLE XVI

ANALYSIS OF COVARIANCE OF PRE, POST AND ADJUSTED POST-TEST ON VO₂ MAX OF EXPERIMENTAL AND CONTROL GROUPS
(Scores in m1/kg/minute)

	EX.GR.I (Circuit training) group	EX.GR. II. (Resistance training) group	EX.GR.III (Combined training) group	Control Group	SV	SS	df	MS	F
Pre Test Mean	41.55	41.89	42	41.66	B	1.88	3	0.63	1.16
					W	30.34	56	0.54	
Post Test Mean	44.13	44.47	44.93	40.48	B	187.494	3	62.50	3.94*
					W	888.82	56	15.872	
Adjusted Post Test Mean	44.37	44.34	44.69	40.60	B	168.90	3	56.30	15.44*
					W	200.56	55	3.647	
Mean Diff	2.57	2.58	2.93	1.18					

The table value required for significance at 0.05 level of confidence with degrees of freedom 3, 56 and 3, 55 is 2.77.

Table XVI shows that the pre test mean scores of VO₂ Max of circuit training was 41.55, resistance training was 41.89, combined circuit and resistance training was 42 and control group was 41.66. The post test means showed differences due to circuit training group, resistance training group, combined circuit and resistance training and control group mean values recorded were 44.13, 44.47, 44.93 and 40.48 respectively.

The obtained F value on pre test scores 1.16 was lesser than the required table value of 2.77 to be significant at 0.05 level. It proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 3.94 was greater than the table value of 2.77. The proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean were calculated and subjected to statistical treatment. The obtained F value of 15.44 was greater than the table value of 2.77. This proved that there was a significant difference among the means due to the experimental training on VO_2 Max.

The mean gain of experimental groups I, II, III and control group were 2.57, 2.58, 2.93 and 1.18 respectively.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table XVII.

TABLE – XVII

SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES ON VO$_2$ MAX

| Experimental Group – I (Circuit Training)	Experimental Group – II (Resistance Training)	Experimental Group – III (Combined training)	Control Group	Mean difference	CI
44.37	44.34	-	-	0.03	2.45
44.37	-	44.69	-	0.32	2.45
44.37	-	-	40.60	3.77*	2.45
-	44.34	44.69	-	0.34	2.45
-	44.34	-	40.60	3.74*	2.45
-	-	44.69	40.60	4.08*	2.45

* Significant

Table - XVII shows that adjusted post test mean difference of circuit training and control group, resistance training and control group and combined training and control group were 3.77, 3.74 and 4.08 respectively. They were greater than the confidence interval value 0.05 level which indicates that there was significant among between of circuit training and control group, resistance training and control group and combined training and control group on VO$_2$ Max.

It also shows that the adjusted post test mean difference of circuit training and resistance training, circuit training and combined training and resistance training and combined training group were 0.33, 0.32 and 0.34 respectively. That they were less than the confidence interval values 2.45 at 0.05 level which indicates that there was no significant difference among circuit training and resistance training, circuit training and combined training and resistance training and combined training group on VO$_2$ Max.

The adjusted post test mean values of circuit training, resistance training, combined circuit and resistance training and control group on VO$_2$ Max are graphically presented in figure 12.

FIGURE - 12

BAR DIAGRAM ON PRE, POST AND ORDERED ADJUSTED MEANS OF VO$_2$ MAX
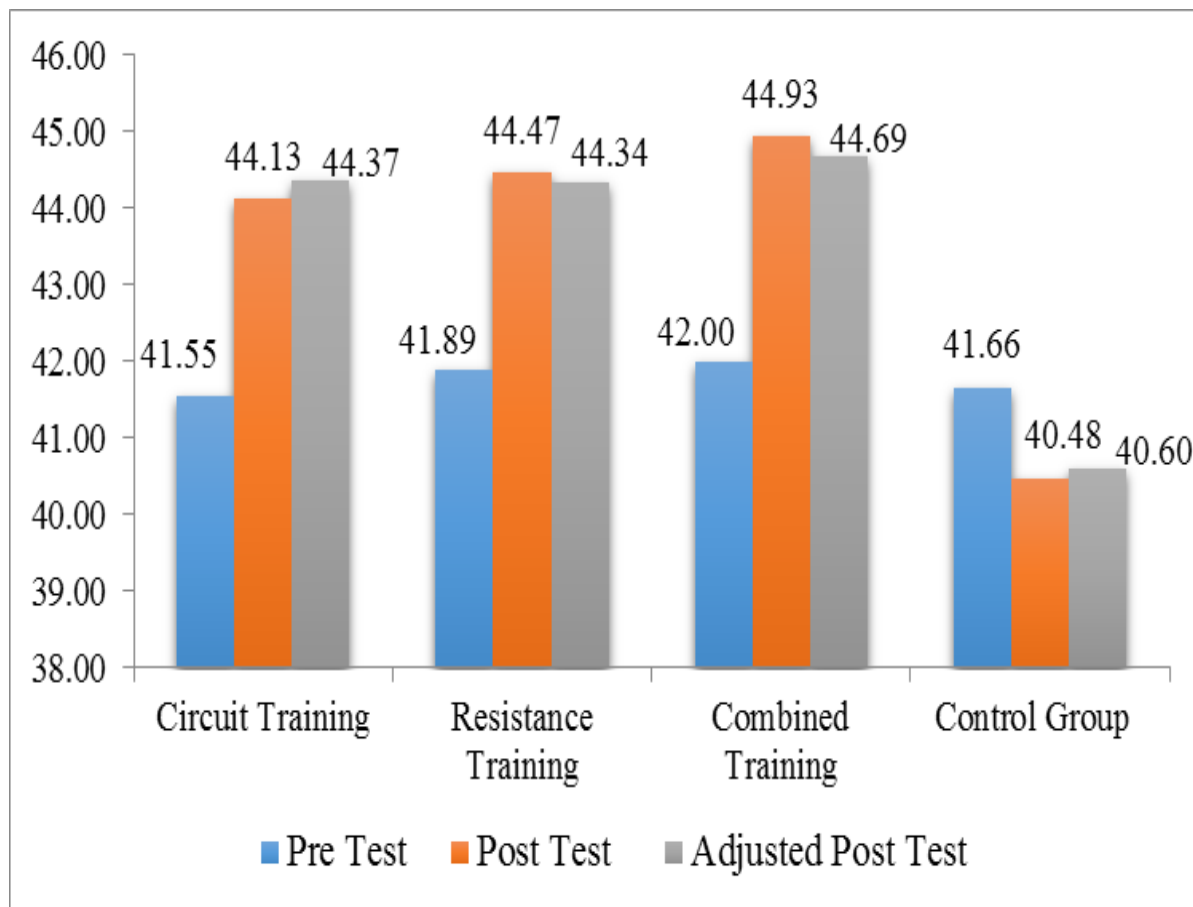
4.10.1 DISCUSSIONS ON THE FINDINGS OF VO$_2$ MAX

The results presented in Table XVII showed that the obtained adjusted means on VO$_2$ Max among circuit training group was 44.37, followed by resistance training group mean value of 44.34, followed by combined circuit and resistance training mean value of 44.69 and control group mean value 40.60. The differences among pre test, post test and adjusted mean scores of the subjects were statistically treated and using ANCOVA the obtained F values were 1.16, 3.94 and 15.44 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table value of 2.77.

The post hoc test analysis through Scheffe's Confidence test proved that due to circuit training, resistance training, combined circuit and resistance training groups improved VO2 Max than the control group and the differences were significant at 0.05 level. Further, the post hoc test analysis shows that there was significant difference between the experimental groups, clearly indicating that combined circuit and resistance training groups was better than the circuit training, resistance training in improving the VO2 Max of the men football players.

This result was in conformity with the findings of the studies undertaken by Spurrs and others (2003) conducted the 3 weeks plyometric programme has significantly improved VO2 Max.

4.11 RESULTS ON RESTING HEART RATE

The analysis of covariance for the pre, post test and adjusted post test data on resting heart rate of the results on the combined effect of circuit and resistance training and combined group and control group have been presented in the table XVIII.

TABLE XVIII

ANALYSIS OF COVARIANCE OF PRE, POST AND ADJUSTED POST-TEST ON RESTING HEART RATE OF EXPERIMENTAL AND CONTROL GROUPS
(Scores In beats per minute)

	EX.GR.I (Circuit training) group	EX.GR. II. (Resistance training) group	EX.GR.III (Combined training) group	Control Group	SV	SS	df	MS	F
Pre Test Mean	73.13	74.40	73.80	75.33	B	39.26	3	13.09	1.07
					W	683.06	56	12.20	
Post Test Mean	70.07	70.33	69.60	74.47	B	228.58	3	76.19	7.91*
					W	539.60	56	9.63	
Adjusted Post Test Mean	70.73	70.18	69.84	73.72	B	137.20	3	45.73	9.74*
					W	258.31	55	4.69	
Mean Diff	3.07	4.07	4.20	0.87					

The table value required for significance at 0.05 level of confidence with degrees of freedom 3, 56 and 3, 55 is 2.77.

Table XVIII shows that the pre test mean scores of resting heart rate of circuit training was 73.13, resistance training was 74.40, combined circuit and resistance training was 73.80 and control group was 75.33. The post test means showed differences due to circuit training group, resistance training group, combined circuit and resistance training and control group mean values recorded were 70.07, 70.33, 69.60 and 74.47 respectively.

The obtained F value on pre test scores 1.07 was lesser than the required table value of 2.77 to be significant at 0.05 level. It proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 7.91 was greater than the table value of 2.77. The proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean were calculated and subjected to statistical treatment. The obtained F value of 9.74 was greater than the table value of 2.77. This proved that there was a significant difference among the means due to the experimental training on resting heart rate.

The mean gain of experimental groups I, II, III and control group were 3.07, 4.07, 4.20 and 0.87 respectively.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table XIX.

TABLE – XIX

**SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES ON RESTING HEART RATE**

Experimental Group – I (Circuit Training)	Experimental Group – II (Resistance Training)	Experimental Group – III (Combined training)	Control Group	Mean difference	CI
70.73	70.18	-	-	0.55	2.78
70.73	-	69.84	-	0.89	2.78
70.73	-	-	73.72	2.99*	2.78
-	70.18	69.84	-	0.35	2.78
-	70.18	-	73.72	3.53*	2.78
-	-	69.84	73.72	3.88*	2.78

* Significant

Table - XIX shows that adjusted post test mean difference of circuit training and control group, resistance training and control group and combined training and control group were 2.99, 3.53 and 3.88 respectively. They were greater than the confidence interval value 0.05 level which indicates that there was significant among between of circuit training and control group, resistance training and control group and combined training and control group on resting heart rate.

It also shows that the adjusted post test mean difference of circuit training and resistance training, circuit training and combined training and resistance training and combined training group were 0.55, 0.89 and 0.35 respectively. That they were lesser than the confidence interval values 2.78 at 0.05 level which indicates that there was no significant difference among circuit training and resistance training, circuit training and combined training, resistance training and combined training group on resting heart rate. The adjusted post test mean values of circuit training, resistance training combined circuit and resistance training and control group on resting heart rate are graphically presented in figure 13.

FIGURE - 13

BAR DIAGRAM ON PRE, POST AND ORDERED ADJUSTED MEANS OF RESTING HEART RATE

(Scores in beats per minute)
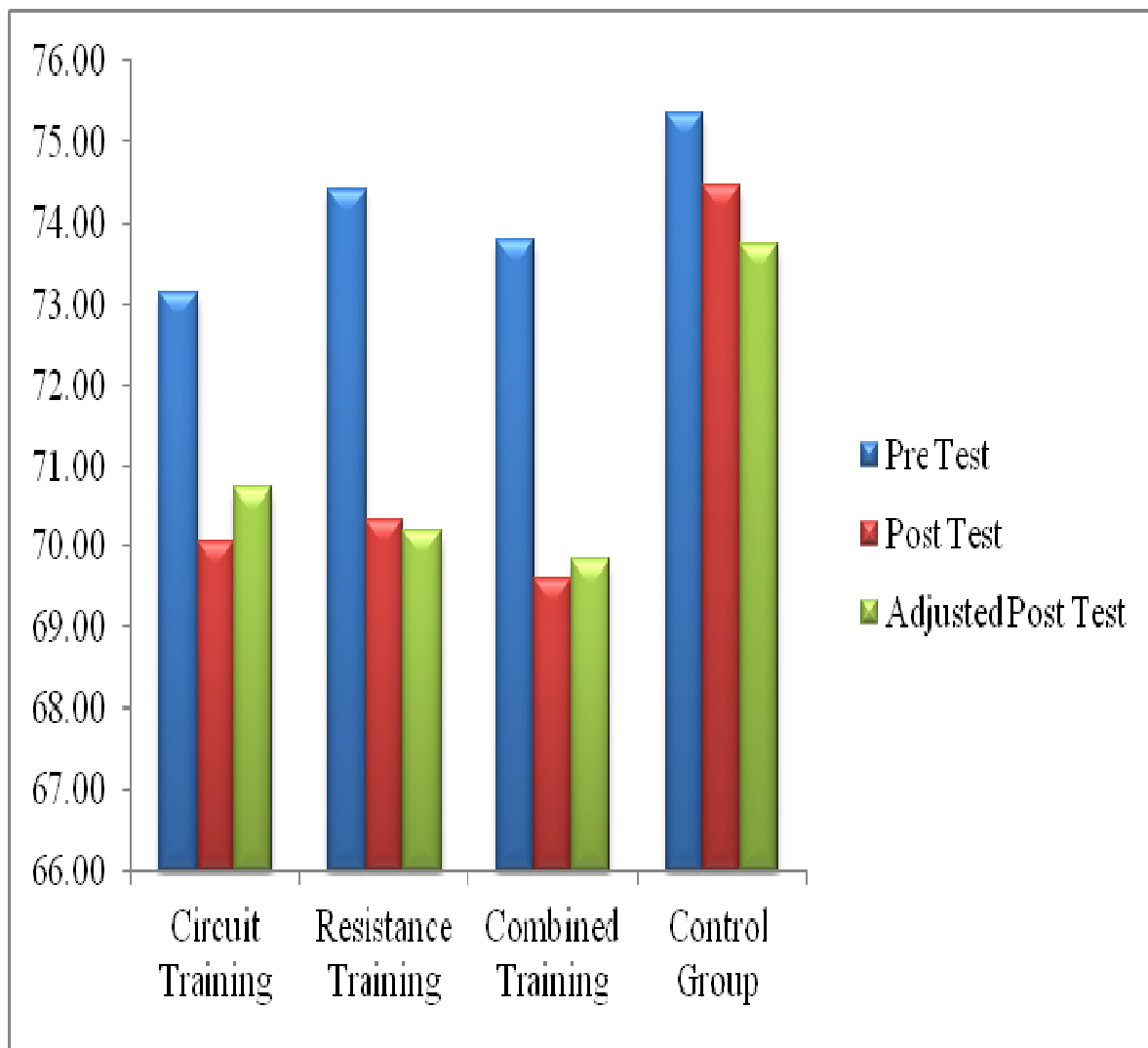
4.11.1 DISCUSSIONS ON THE FINDINGS OF RESTING HEART RATE

The results presented in Table XIX showed that the obtained adjusted means resting heart rate among circuit training group was 70.73, followed by resistance training group mean value of 70.18, followed by combined circuit and resistance training mean value of 69.84 and control group mean value 73.72. The differences among pre test, post test and adjusted mean scores of the subjects were statistically treated and using ANCOVA the obtained F values were 1.07, 7.91 and 9.74 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F value on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table value of 2.77.

The post hoc test analysis through Scheffe's Confidence test proved that due to circuit training, resistance training, combined circuit and resistance training groups decrease resting heart rate than the control group and the differences were significant at 0.05 level. Further, the post hoc test analysis shows that there was significant difference between the experimental groups, clearly indicating that combined circuit and resistance training groups was better than the circuit training, resistance training in decrease the resting heart rate of the men football players.

This result was in conformity with the findings of the studies undertaken by Brown and others (2010) conducted the plyometric depth jumps has significantly decrease resting heart rate.

4.12 RESULTS ON DRIBBLING

The analysis of covariance for the pre, post test and adjusted post test data on dribbling of the results on the combined effect of circuit and resistance training and combined group and control group have been presented in the table XX.

TABLE XX

ANALYSIS OF COVARIANCE OF PRE TEST POST AND ADJUSTED POST-TEST ON DRIBBLING OF EXPERIMENTAL AND CONTROL GROUPS
(Scores in seconds)

	EX.GR.I (Circuit training) group	EX.GR. II. (Resistance training) group	EX.GR.III (Combined training) group	Control Group	SV	SS	df	MS	F
Pre Test Mean	14.08	14.04	14.01	14.02	B	0.04	3	0.02	1.88
					W	0.48	56	0.01	
Post Test Mean	13.33	13.19	12.97	14.68	B	26.93	3	8.98	42.82*
					W	11.74	56	0.210	
Adjusted Post Test Mean	13.26	13.19	13.01	14.71	B	27.57	3	9.19	47.83*
					W	10.56	55	0.192	
Mean Diff	0.75	0.85	1.04	0.66					

The table value required for significance at 0.05 level of confidence with degrees of freedom 3, 56 and 3, 55 is 2.77.

Table XX shows that the pre test mean scores of dribbling of circuit training was 14.08, resistance training was 14.04, combined circuit and resistance training was 14.01 and control group was 14.02. The post test means showed differences due to circuit training group, resistance training group, combined circuit and resistance training and control group mean values recorded were 13.33, 13.19, 12.97 and 14.68 respectively.

The obtained F value on pre test scores 1.88 was lesser than the required table value of 2.77 to be significant at 0.05 level. It proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 42.82 was greater than the table value of 2.77. The proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean were calculated and subjected to statistical treatment. The obtained F value of 47.83 was greater than the table value of 2.77. This proved that there was a significant difference among the means due to the experimental training on dribbling.

The mean gain of experimental groups I, II, III and control group were 0.75, 0.85, 1.04 and 0.66 respectively.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table XXI.

TABLE – XXI

SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES ON DRIBBLING

| Experimental Group – I (Circuit Training)	Experimental Group – II (Resistance Training)	Experimental Group – III (Combined training)	Control Group	Mean difference	CI
13.26	13.19	-	-	0.07	0.56
13.26	-	13.01	-	0.25	0.56
13.26	-	-	14.71	1.45*	0.56
-	13.19	13.01	-	0.18	0.56
-	13.19	--	14.71	1.52*	0.56
-	-	13.01	14.71	1.70*	0.56

* Significant

Table - XXI shows that adjusted post test mean difference of circuit training and control group, resistance training and control group and combined training and control group were 1.45, 1.52 and 1.70 respectively. They were greater than the confidence interval value 0.05 level which indicates that there was significant among between of circuit training and control group, resistance training and control group and combined training and control group on dribbling.

It also shows that the adjusted post test mean difference of circuit training and resistance training, circuit training and combined training and resistance training and combined training group were 0.77, 0.25, and 0.18 respectively. That they were lesser than the confidence interval values 0.56 at 0.05 level which indicates that there was no significant difference among circuit training and resistance training, circuit training and combined training and resistance training and combined training group on dribbling.

The adjusted post test mean values of circuit training, resistance training, combined circuit and resistance training and control group on dribbling are graphically presented in figure 14.

FIGURE - 14

**BAR DIAGRAM ON PRE, POST AND ORDERED ADJUSTED
MEANS OF DRIBBLING**

(Scores in seconds)
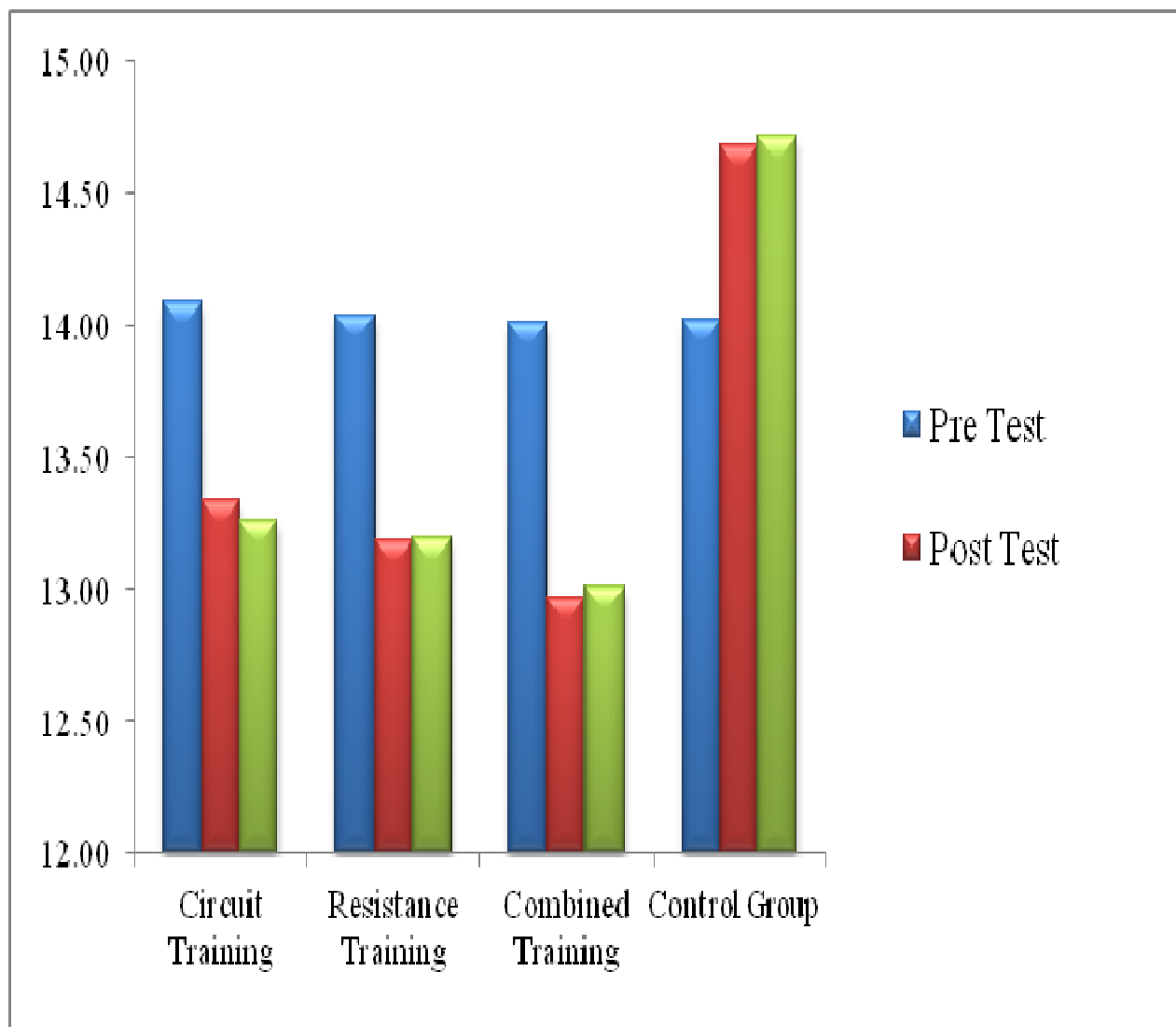
4.12.1 DISCUSSIONS ON THE FINDINGS OF DRIBBLING

The results presented in Table XXI showed that the obtained adjusted means dribbling among circuit training group was 13.26, followed by resistance training group mean value of 13.19, followed by combined circuit and resistance training mean value of 13.01 and control group mean value 14.71. The differences among pre test, post test and adjusted mean scores of the subjects were statistically treated and using ANCOVA the obtained F values were 1.88, 42.82 and 47.83 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table value of 2.77.

The post hoc test analysis through Scheffe's Confidence test proved that due to circuit training, resistance training, combined circuit and resistance training groups improved dribbling than the control group and the differences were significant at 0.05 level. Further, the post hoc test analysis shows that there was significant difference between the experimental groups, clearly indicating that combined circuit and resistance training groups was better than the circuit training, resistance training in improved the dribbling of the men football players.

This result was in conformity with the findings of the studies undertaken by Halland (2003) conducted the interval training and soccer specific training has significantly improved dribbling skill.

4.13 RESULTS ON SHOOTING

The analysis of covariance for the pre, post test and adjusted post test data on shooting of the results on the combined effect of circuit and resistance training and combined group and control group have been presented in the table XXII.

TABLE XXII

ANALYSIS OF COVARIANCE OF PRE TEST POST AND ADJUSTED POST-TEST ON SHOOTING OF EXPERIMENTAL AND CONTROL GROUPS
(Scores in Points)

	EX.GR.I (Circuit training) group	EX.GR. II. (Resistance training) group	EX.GR.III (Combined training) group	Control Group	SV	SS	df	MS	F
Pre Test Mean	5.27	5.20	5.13	5.13	B	0.18	3	0.06	1.10
					W	3	56	0.06	
Post Test Mean	6.07	6.27	7.20	4.87	B	41.40	3	13.8	21.47*
					W	36	56	0.64	
Adjusted Post Test Mean	6.03	6.26	7.22	4.89	B	41.35	3	13.78	24.95*
					W	30.39	55	0.55	
Mean Diff	0.80	1.07	2.07	0.27					

The table value required for significance at 0.05 level of confidence with degrees of freedom 3, 56 and 3, 55 is 2.77.

Table XXII shows that the pre test mean scores of shooting of circuit training was 5.27, resistance training was 5.20, combined circuit and resistance training was 5.13 and control group was 5.13. The post test means showed differences due to circuit training group, resistance training group, combined circuit and resistance training and control group mean values recorded were 6.07, 6.27, 7.20 and 4.87 respectively.

The obtained F value on pre test scores 1.10 was lesser than the required table value of 2.77 to be significant at 0.05 level. It proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 21.47 was greater than the table value of 2.77. The proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean were calculated and subjected to statistical treatment. The obtained F value of 24.95 was greater than the table value of 2.77. This proved that there was a significant difference among the means due to the experimental training on shooting.

The mean gain of experimental groups I, II, III and control group were 0.80, 1.07, 2.07 and 0.27 respectively.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table XXIII.

TABLE - XXIII
SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES ON SHOOTING

| Experimental Group – I (Circuit Training)	Experimental Group – II (Resistance Training)	Experimental Group – III (Combined training)	Control Group	Mean difference	CI
6.03	6.26	-	-	0.23	0.95
6.03	-	7.22	-	1.20*	0.95
6.03	-	-	4.89	1.14*	0.95
-	6.26	7.22	-	0.97*	0.95
-	6.26	-	4.89	1.37*	0.95
-	-	7.22	4.89	2.33*	0.95

* Significant

Table - XXIII shows that adjusted post test mean difference of circuit training and combined training, circuit training and control group, resistance training and combined training, resistance training and control group and combined training and control group were 1.20, 1.14, 0.97, 1.37 and 2.33 respectively. They were greater than the confidence interval value 0.05 level which indicates that there was significant among between of circuit training and combined training, circuit training and control group, resistance training and combined training, resistance training and control group and combined training and control group on shooting.

It also shows that the adjusted post test mean difference of circuit training and resistance training group were 0.23 respectively. That they were lesser than the confidence interval values 0.95 at 0.05 level which indicates that there was no significant difference among circuit training and resistance training group on shooting.

The adjusted post test mean values of circuit training, resistance training, combined circuit and resistance training and control group on shooting are graphically presented in figure 15.

FIGURE - 15

**BAR DIAGRAM ON PRE, POST AND ORDERED ADJUSTED
MEANS OF SHOOTING**
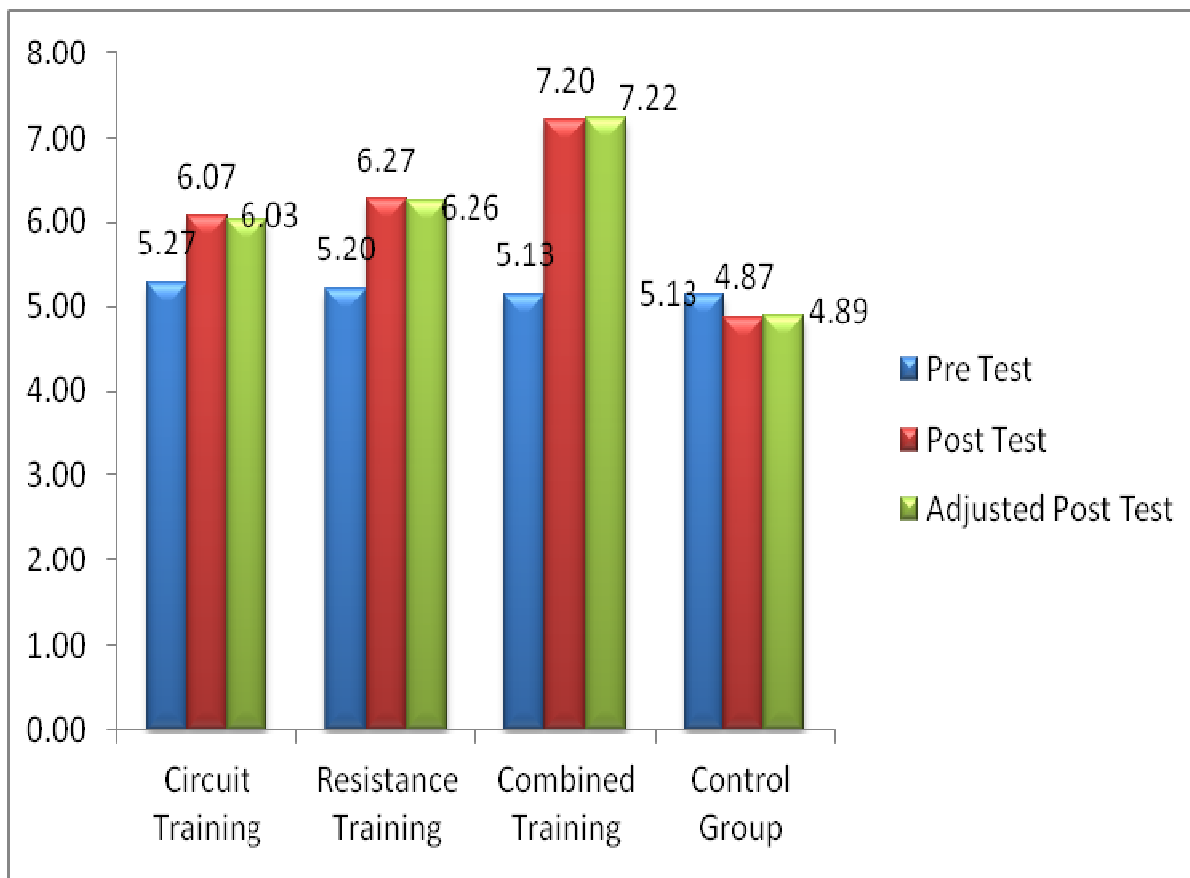
4.13.1 DISCUSSIONS ON THE FINDINGS OF SHOOTING

The results presented in Table XXIII showed that the obtained adjusted means shooting among circuit training group was 6.03, followed by resistance training group mean value of 6.26, followed by combined circuit and resistance training mean value of 7.22 and control group mean value 4.89. The differences among pre test, post test and adjusted mean scores of the subjects were statistically treated and using ANCOVA the obtained F values were 1.10, 21.47 and 24.95 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table value of 2.77.

The post hoc test analysis through Scheffe's Confidence test proved that due to circuit training, resistance training, combined circuit and resistance training groups improved shooting than the control group and the differences were significant at 0.05 level. Further, the post hoc test analysis shows that there was significant difference between the experimental groups, clearly indicating that combined circuit and resistance training groups was better than the circuit training, resistance training in improved the shooting of the men football players.

This result was in conformity with the findings of the studies undertaken by **Barnes, et al (2004)** conducted the soccer specific training has significantly improved shooting skill.

4.14 RESULTS ON PASSING

The analysis of covariance for the pre, post test and adjusted post test data on passing of the results on the combined effect of circuit and resistance training and combined group and control group have been presented in the table XXIV.

Table XXIV

ANALYSIS OF COVARIANCE OF PRE TEST POST AND ADJUSTED POST-TEST ON PASSING OF EXPERIMENTAL AND CONTROL GROUPS
(Scores in Points)

	EX.GR.I (Circuit training) group	EX.GR. II. (Resistance training) group	EX.GR.III (Combined training) group	Control Group	SV	SS	df	MS	F
Pre Test Mean	4.80	5.27	5.07	5.07	B	1.65	3	0.55	1.13
					W	27	56	0.49	
Post Test Mean	6.33	6.60	6.87	5.40	B	18.3	3	6.11	10.61*
					W	32.2	56	0.576	
Adjusted Post Test Mean	6.42	6.53	6.86	5.39	B	18	3	6.00	16.50*
					W	20	55	0.364	
Mean Diff	1.53	1.33	1.80	0.33					

The table value required for significance at 0.05 level of confidence with degrees of freedom 3, 56 and 3, 55 is 2.77.

Table XXIV shows that the pre test mean scores of passing of circuit training was 4.80, resistance training was 5.27, combined circuit and resistance training was 5.07 and control group was 5.07. The post test means showed differences due to circuit training group, resistance training group,

combined circuit and resistance training and control group mean values recorded were 6.33, 6.60, 6.87 and 5.40 respectively.

The obtained F value on pre test scores 1.13 was lesser than the required table value of 2.77 to be significant at 0.05 level. It proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 10.63 was greater than the table value of 2.77. The proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean were calculated and subjected to statistical treatment. The obtained F value of 16.50 was greater than the table value of 2.77. This proved that there was a significant difference among the means due to the experimental training on passing.

The mean gain of experimental groups I, II, III and control group were 1.53, 1.33, 1.80 and 0.33 respectively.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table XXV.

TABLE – XXV
SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES ON PASSING

| Experimental Group – I (Circuit Training)	Experimental Group – II (Resistance Training)	Experimental Group – III (Combined training)	Control Group	Mean difference	CI
6.42	6.53	-	-	0.11	0.93
6.42	-	6.86	--	0.44	0.93
6.42	-	-	5.39	1.02*	0.93
-	6.53	6.86	-	0.34	0.93
-	6.53	-	5.39	1.13*	0.93
-	-	6.86	5.39	1.47*	0.93

* Significant

Table - XXV shows that adjusted post test mean difference of circuit training and control group, resistance training and control group and combined training and control group were 1.02, 1.13 and 1.47respectively. They were greater than the confidence interval value 0.05 level which indicates that there was significant among between of circuit training and control group, resistance training and control group and combined training and control group on passing.

It also shows that the adjusted post test mean difference of circuit training and resistance training, circuit training and combined training and resistance training and combined training group were 0.11, 0.44, 034 respectively. That they were lesser than the confidence interval value 0.93 at 0.05 level which indicates that there was no significant difference among circuit training and resistance training, circuit training and combined training and resistance training and combined training group on passing.

The adjusted post test mean values of circuit training, resistance training, combined circuit and resistance training and control group on passing are graphically presented in figure 16.

FIGURE - 16

**BAR DIAGRAM ON PRE, POST AND ORDERED ADJUSTED
MEANS OF PASSING**
(Scores in points)
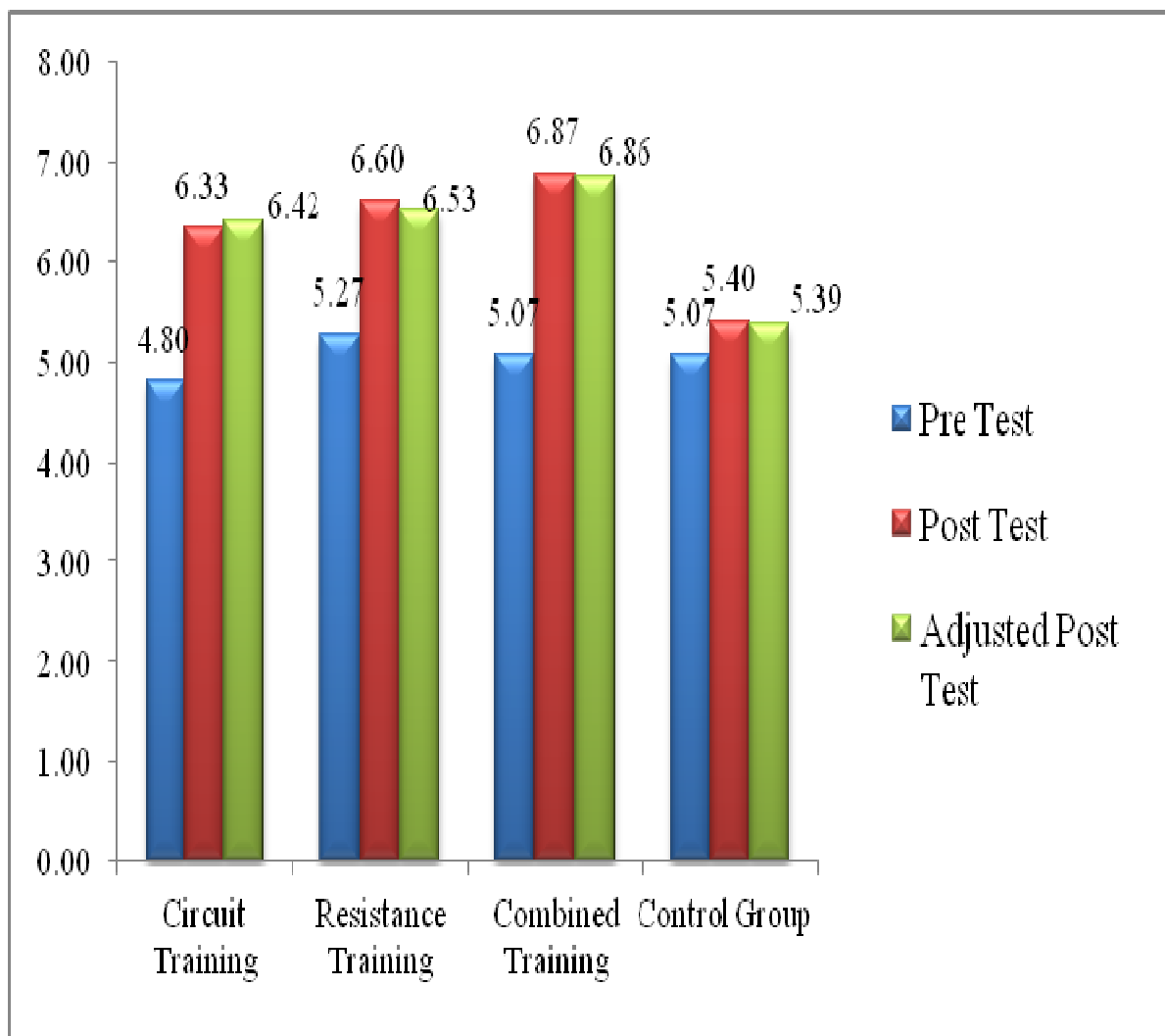
4.14.1 DISCUSSIONS ON THE FINDINGS OF PASSING

The results presented in Table XXV showed that the obtained adjusted means passing among circuit training group was 6.42, followed by resistance training group mean value of 6.53, followed by combined circuit and resistance training mean value of 6.86 and control group mean value 5.39. The differences among pre test, post test and adjusted mean scores of the subjects were statistically treated and using ANCOVA the obtained F value were 1.13, 10.61 and 16.50 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F value on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table value of 2.77.

The post hoc test analysis through Scheffe's Confidence test proved that due to circuit training, resistance training, combined circuit and resistance training groups improved passing than the control group and the differences were significant at 0.05 level. Further, the post hoc test analysis shows that there was significant difference between the experimental groups, clearly indicating that combined circuit and resistance training groups was better than the circuit training, resistance training in improved the passing of the men football players.

This result was in conformity with the findings of the studies undertaken by Russel and others **(2010)** conducted the soccer specific training has significantly improved passing skill.

4.15 RESULTS ON PLAYING PERFORMANCE

The analysis of covariance for the pre, post test and adjusted post test data on playing performance of the results on the combined effect of circuit and resistance training and combined group and control group have been presented in the table XXVI.

TABLE- XXVI

ANALYSIS OF COVARIANCE OF PRE TEST POST AND ADJUSTED POST-TEST ON PLAYING PERFORMANCE OF EXPERIMENTAL AND CONTROL GROUPS
(Scores in Points)

	EX.GR.I (Circuit training) group	EX.GR. II. (Resistance training) group	EX.GR.III (Combined training) group	Control Group	SV	SS	df	MS	F
Pre Test Mean	69.53	70.20	68.27	68.33	B	40.18	3	13.39	1.62
					W	462	56	8.26	
Post Test Mean	74.93	75.33	75.80	69.40	B	404.67	3	134.89	16.78*
					W	450.27	56	8.040	
Adjusted Post Test Mean	74.59	74.48	76.43	69.97	B	337.35	3	112.45	34.60*
					W	178.74	55	3.250	
Mean Diff	5.40	5.13	7.53	1.07					

The table value required for significance at 0.05 level of confidence with degrees of freedom 3, 56 and 3, 55 is 2.77.

Table XXVI shows that the pre test mean scores of playing performance of circuit training was 69.53, resistance training was 70.20, combined circuit and resistance training was 68.27 and control group was 68.33. The post test means showed differences due to circuit training group, resistance training group, combined circuit and resistance training and control group mean values recorded were 74.93, 75.33, 75.80 and 69.40 respectively.

The obtained F value on pre test scores 1.62 was lesser than the required table value of 2.77 to be significant at 0.05 level. It proved that there were no significant difference between the experimental and control groups indicating that the process of randomization of the groups was perfect while assigning the subjects to groups.

The post test scores analysis proved that there were significant differences between the groups, as the obtained F value 16.78 was greater than the table value of 2.77. The proved that the differences between the post test means of the subjects were significant.

Taking into consideration the pre and post test scores among the groups, adjusted mean were calculated and subjected to statistical treatment. The obtained F value of 34.40 was greater than the table value of 2.77. This proved that there was a significant difference among the means due to the experimental training on playing performance.

The mean gain of experimental groups I, II, III and control group were 5.40, 5.13, 7.53 and 1.07 respectively.

Since significant differences were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results were presented in Table XXV.

TABLE – XXVII

SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES ON PLAYING PERFROMANCE

Experimental Group – I (Circuit Training)	Experimental Group – II (Resistance Training)	Experimental Group – III (Combined training)	Control Group	Mean difference	CI
74.59	74.48	-	-	0.11	2.31
74.59	-	76.43	-	1.84	2.31
74.59	-	-	69.97	4.61*	2.31
-	74.48	76.43	-	1.95	2.31
-	74.48	-	69.97	4.50*	2.31
-	-	76.43	69.97	6.45*	2.31

* Significant

Table - XXVII shows that adjusted post test mean difference of circuit training and control group, resistance training and control group and combined training and control group were 4.61,4.50 and 6.45 respectively. They were greater than the confidence interval value 0.05 level which indicates that there was significant among between of circuit training and control group, resistance training and control group and combined training and control group on playing performance.

It also shows that the adjusted post test mean difference of circuit training and resistance training, circuit training and combined training and resistance training and combined training group were 0.11, 1.84, 1.95 respectively. That they were lesser than the confidence interval value 2.31 at 0.05 level which indicates that there was no significant difference among circuit training and resistance training, circuit training and combined training and resistance training and combined training group on playing performance.

The adjusted post test mean values of circuit training, resistance training, combined circuit and resistance training and control group on playing performance are graphically presented in figure 17.

FIGURE – 17

**BAR DIAGRAM ON PRE, POST AND ORDERED ADJUSTED
MEANS OF PLAYING PERFORMANCE**

(Scores in points)
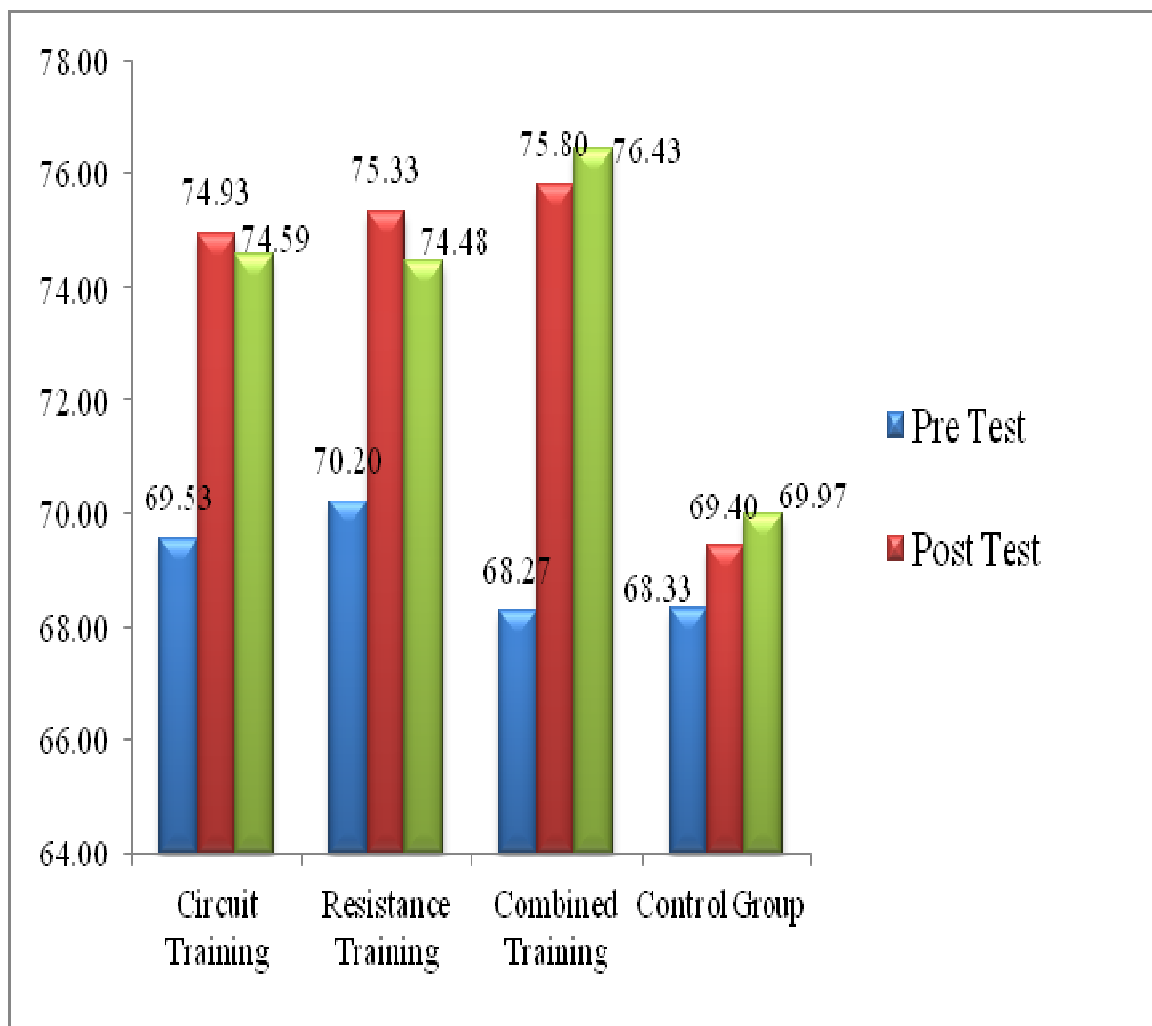
4.15.1 DISCUSSIONS ON THE FINDINGS OF PLAYING PERFORMANCE

The results presented in Table XXVII showed that the obtained adjusted means playing performance among circuit training group was 74.59, followed by resistance training group mean value of 74.48, followed by combined circuit and resistance training mean value of 76.43 and control group mean value 69.97. The differences among pre test, post test and adjusted mean scores of the subjects were statistically treated and using ANCOVA the obtained F values were 1.62, 16.78 and 34.60 respectively. It was found that obtained F value on pre test scores were not significant and the obtained F values on post test and adjusted means were significant at 0.05 level of confidence as these were greater than the required table value of 2.77.

The post hoc test analysis through Scheffe's Confidence test proved that due to circuit training, resistance training, combined circuit and resistance training groups improved playing performance than the control group and the differences were significant at 0.05 level. Further, the post hoc test analysis shows that there was significant difference between the experimental groups, clearly indicating that combined circuit and resistance training groups was better than the circuit training, resistance training in improved the playing performance of the men football players.

This result was in conformity with the findings of the studies undertaken by Jovanovic and others **(2011)** conducted the soccer specific training has significantly improved playing performance skill.

4.16 DISCUSSION ON HYPOTHESES

1. The first hypothesis state that there would be significant improvement on selected physical variables of speed, endurance, agility, strength and flexibility due to circuit training, resistance training, combined circuit and resistance training group greater than the control group among men football players.

   According to Table IV - XV it was proved that there was significant difference between Circuit Training group, Resistance training group, Combined group (Circuit and Resistance Training) than the control group and hence the research hypothesis was accepted and null hypothesis rejected at 0.05 level of confidence.

2. The second hypothesis state that there would be significant improvement on selected physiological variables of Vo2 max, resting heart rate due to circuit training, resistance training, combined circuit and resistance training group greater than the control group among men football players.

   Table XVI - XIX it was proved that there was significant difference between circuit training group, resistance training group, Combined group (Circuit and Resistance Training) than the control group and hence the research hypothesis was accepted and null hypothesis rejected at 0.05 level of confidence.

3. The third hypothesis state that there would be significant improvement on selected performance variable of dribbling, passing, shooting and playing performance due to circuit training, resistance training, combined circuit and resistance training group greater than the control group among men football players.

   According to Table XX - XXVII it was proved that there was significant difference between Circuit Training group, Resistance training group, Combined group (Circuit and Resistance Training) than the control group and hence the research hypothesis was accepted and null hypothesis rejected at 0.05 level of confidence.