CHAPTER - IV

RESULTS AND DISCUSSIONS

4.1 OVERVIEW

This chapter deals with the presentation of data with statistical applications, results and discussions. The purpose of the study was to find out the effect of Tai Chi and Yogic practices with and without green tea supplementation on obese men. For the purpose of the study, seventy five (N=75) obese men were selected from Chennai District, Tamil Nadu as subjects at random and their age ranged between 30 and 40 years. Obese of the subjects was determined through a person's BMI by the following formula: Metric: BMI = kilograms / height meters^2. Men with 30 kg/m^2 to 40kg/m^2 of Body Mass Index were considered as obese men. The subjects were from different family backgrounds and homogeneous in their activities. They were divided into five groups consisting of fifteen (n=15) subjects each. The selection of control and experimental groups was done at random. Experimental Group I underwent Tai Chi without green tea for five days per week. Experimental Group II underwent Tai Chi with green tea for five days per week. Experimental Group III underwent yoga without green tea for five days per week. Experimental Group IV underwent yoga with green tea for five days per week and group V acted as Control Group. Subjects who were in the control group were not exposed to any experimental training for the period of 16 weeks. Based on the consideration of feasibility criteria, availability of instruments and the relevance of the variables to the present study, following variables were selected:

I. HEALTH RELATED PHYSICAL FITNESS VARIABLES

1. Muscular Strength
2. Muscular Endurance
3. Flexibility
4. Cardio Respiratory Endurance
5. Body Composition

II. BIOCHEMICAL VARIABLES

1. Fasting Blood Glucose
2. Total Cholesterol
3. High Density Lipoproteins
4. Low Density Lipoproteins
5. Triglycerides

The study was formulated as a true random group design, consisting of a pre-test and post-test. The seventy five obese men subjects (N=75) were randomly assigned to five groups of fifteen subjects in each group. The groups were assigned as Experimental Groups I, II, III, IV and group V acted as control group. Pre test was conducted for all seventy five (N=75) subjects on selected health related physical fitness variables such as muscular strength, muscular endurance, flexibility, cardio respiratory endurance and body composition; biochemical variables such as fasting blood glucose, total cholesterol, high density lipoproteins, low density lipoproteins and triglycerides. Based on the response of the subjects in the pilot study, the training schedule for the experimental groups was constructed The experimental groups participated in their respective, Tai Chi without green tea supplementation, Tai Chi with green tea supplementation, yoga without green tea supplementation and yoga with green tea supplementation for twelve weeks. The control group did not undergo

any experimental training. The post test was conducted on the above said dependent variables after a period of twelve weeks. The differences between the initial and final means were considered as the effect of respective treatment. To test the statistical significance, the obtained data were subjected to statistical treatment using ANCOVA.

4.2 TEST OF SIGNIFICANCE

This is the vital portion of thesis achieving the conclusion by examining the hypotheses. The procedure of testing the hypotheses was either by accepting the hypotheses or rejecting the same in accordance with the results obtained in relation to the level of confidence. The test was usually called the test of significance since the scholar tested whether the differences within many groups' scores were significant or not. In this study, if the obtained F-value was (or F- values were) greater than the table value, the hypotheses were accepted to the effect that there existed significant differences among the means of the groups compared and if the obtained values were lesser than the required values, then the null hypotheses were accepted to the effect that there existed no significant differences among the means of the groups under study.

4.2.1 LEVEL OF SIGNIFICANCE

The subjects were compared on the effect of Tai Chi and yogic practices with and without green tea supplementation on selected health related physical fitness and bio chemical variables among obese men. The differences between means of initial and final means on selected criterion variables were subjected to statistical treatment using analysis of covariance (ANCOVA). In all the cases, 0.05 level of confidence was fixed to test the significance, which was considered as appropriate.

4.3 COMPUTATION OF ANALYSIS OF COVARIANCE AND POST HOC TEST

4.3.1 RESULTS ON MUSCULAR STRENGTH

The descriptive statistics on obtained data on Muscular Strength due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of obese men was presented in Table IV.

TABLE IV

DESCRIPTIVE STATISTICS SHOWING MEAN AND STANDARD DEVIATION ON INITIAL, FINAL AND ADJUSTED MEANS ON MUSCULAR STRENGTH

	TC Group	TCwGT Group	YA Group	YAwGT Group	Control Group
Pre Test Mean	4.07	4.07	4.20	4.07	3.93
Std Dev	0.96	0.80	1.37	1.16	1.16
Post Test Mean	5.60	5.73	4.87	5.47	3.93
Std Dev	0.83	0.80	1.37	0.99	1.16
Adjusted Post Test Mean	5.60	5.73	4.78	5.47	3.89

As shown in Table IV, the pre test mean on Muscular Strength of TC group is 4.07 with standard deviation $\pm$0.96 pre test mean of TCwGT group being 4.07 with standard deviation $\pm$0.80, the pre test mean of YA group being 4.20 with standard deviation $\pm$1.37, the pre test mean of YAwGT group is 4.07 with standard deviation $\pm$1.16 the pre test mean of control group being 3.93 with standard deviation $\pm$1.16.

The results presented in Table IV, the post test mean on muscular strength of TC group is 5.60 with standard deviation $\pm$0.83 post test mean of TCwGT group

being 5.73 with standard deviation ±0.80, the post test mean of YA group being 4.87 with standard deviation ±0.80, the post test mean of YAwGT group being 5.47 with standard deviation ±0.99 and control group being 3.80 with standard deviation ±1.15.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on muscular strength on TC group was 5.60, TCwGT group was 5.73, YA group was 4.78 YAwGT group was 5.47 and control group was 3.89.

The statistical analysis comparing the initial and final means of muscular strength due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of muscular strength is presented in Table V.

TABLE V
COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA ON MUSCULAR STRENGTH

	SOV	Sum of Squares	DF	Mean Squares	Obtained F'
Pre Test Mean	**B**	0.53	4	0.13	0.11
	W	86.13	70	1.23	
Post Test Mean	**B**	37.95	4	9.49	9.43*
	W	70.40	70	1.01	
Adjusted Post Test Mean	**B**	35.34	4	8.84	18.22*
	W	33.47	69	0.49	

SOV: Source of Variance; B: Between W: Within
Required $F_{(0.05),(df\ 4,\ 70)} = 2.50$ $F_{(0.05),(df\ 4,69)} = 2.50$
* Significant at 0.05 level of confidence

The obtained F ratio of 0.11 on pre test means on muscular strength of the groups was not significant at 0.05 level as the obtained F value was less than the

required table F value of 2.58 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

The obtained F ratio of 9.43 on post test means on muscular strength of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was significant difference in means of the groups after the experimental treatments.

The obtained F value on adjusted means on muscular strength was 18.22. The obtained F value was greater than the required value of 2.58 and hence it was accepted that there was significant differences among the adjusted means on the muscular strength of the subjects. Since significant improvements were recorded, the results were subjected to post hoc analysis using Scheffe's Confidence Interval test. The results are presented in Table VI.

TABLE VI

MULTIPLE COMPARISONS BETWEEN TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA AND CONTROL GROUPS AND SCHEFFE'S POST HOC ANALYSIS ON MUSCULAR STRENGTH

TC group	TCwGT Group	YA Group	YAwGT Group	Control Group	MEAN DIFF	C.I
5.60	5.73				0.13	0.82
5.60		4.78			0.82*	0.82
5.60			5.47		0.13	0.82
5.60				3.89	1.71*	0.82
	5.73	4.78			0.95*	0.82
	5.73		5.47		0.27	0.82
	5.73			3.89	1.85*	0.82
		4.78	5.47		0.69	0.82
		4.78		3.89	0.89*	0.82
			5.47	3.89	1.58*	0.82

***** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were greater than required confidence interval of 0.82.

Tai Chi without Green tea Vs Yoga without green tea Group MD 0.82

Tai Chi without Green tea Vs Control Group MD1.71

Tai Chi with Green tea Vs Yoga without green tea MD 0.95

Tai Chi with Green tea Vs Control Group MD1.85

Yoga without green tea Vs Control Group MD 0.89

Yoga with green tea Vs Control Group MD 1.58

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were lesser than required confidence interval of 0.82

Tai Chi without Green tea Vs Tai Chi with Green tea MD: 0.13

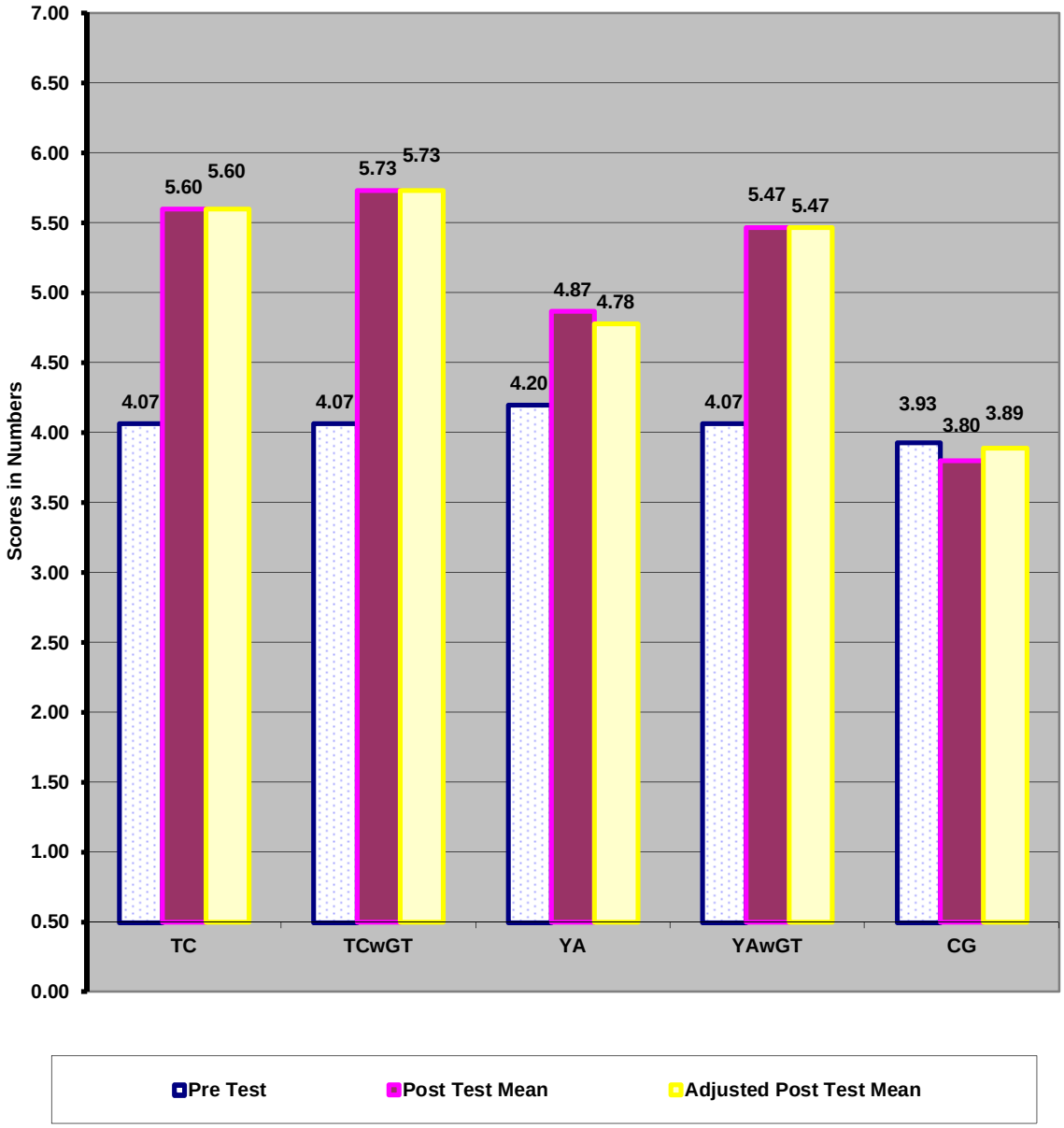
Tai Chi without Green tea Vs Yoga with green tea group MD 0.13

Tai Chi with Green tea Vs Yoga with green tea MD 0.27

Yoga without green tea Vs Yoga with Green tea MD 0.69

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure 1.

FIGURE 1
BAR DIAGRAM SHOWING PRE, POST AND ADJUSTED MEANS ON MUSCULAR STRENGTH



4.3.1.1 DISCUSSION ON FINDINGS ON MUSCULAR STRENGTH

The analysis of covariance due to effects of experimental treatments, namely Tai Chi without green tea supplementation (TC), Tai Chi with green tea supplementation (TCwGT), yoga without green tea supplementation (YA) and yoga with green tea supplementation (YAwGT) on muscular strength is presented in Table V. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 18.22 was greater than the required table value to be significant at 0.05 level. Thus, the results proved that there were significant improvements on muscular strength due to 12 weeks experimental treatment among obese men.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results presented in Table VI. The adjusted means of TC 5.60, TCwGT 5.73, YA 4.78 and YAwGT 5.47 were greater that mean of CG 3.89, on muscular strength among obese men. It was also proved that paired adjusted mean comparisons between TC and control group (CG), TCwGT and CG, YA and CG, YAwGT and CG were significant. And the results proved that comparing to control group all the four experimental treatments significantly improved muscular strength among obese men. The comparisons of differences among experimental groups results presented proved that TC and TCwGT were significantly better than YA. And there was no significant difference between TC and TCwGT, TC and YAwGT, TCwGT and YAwGT, and YA and YAwGT on muscular strength among obese men.

Thus, it was found that TC and TCwGT were significantly better than YA in improving muscular strength among obese men. Though adjusted mean of TCwGT was greater than mean of YAwGT the difference was not significant at 0.05 level.

Thus, it was proved that adding green tea supplementation either with Tai Chi or yoga would give more beneficial effect on muscular strength among obese men.

Chenchen et al. (2004) studied the physical and psychological effects of Tai Chi and found that it significantly increased the balance and strength, cardiovascular and respiratory function, flexibility, immune system, symptoms of arthritis, muscular strength, and psychological effects. Zachary and Shi (2007) investigated the efficacy of 12 weeks of Tai Chi practice and observed that it significantly increased the lower limb muscular strength and strength ratios in an older population.

Chen, et al. (2009) investigated the effect of yoga exercise intervention and found that there was significant difference on muscular strength in school age asthmatic children. Shankardayalan (1996) investigated the effect of yogic exercise and found that is significantly improved the muscular performance and body composition in adult males. Shirley Telles, et al. (2009) investigated the short term health impact of yoga and diet change programme and that it showed significantly increased the muscular grip strength on obesity.

Chung, et al. (2008) investigated the effect of green tea extract (GTE) on obese women and to explore the relationship between GTE and obesity-related hormone peptides and showed that no statistical difference existed in % reduction in body weight, body mass index between the GTE and placebo groups after 12 weeks of treatment. Daniela, et al. (2005) investigated the effect of the addition of two cups of green tea GT (containing approximately 250 mg of total catechins) to a controlled diet in a group of healthy volunteers and suggested the ability of GT, consumed within a balanced controlled diet, to improve overall the antioxidative status and to protect against oxidative damage in humans.

The theoretical foundations proved that isolated Tai Chi, yogic practice and green tea supplementation contributed to the benefit of physical fitness and biochemical variables. However, there was scarcity of researches comparing effects of Tai Chi and yogic practices with and without green tea supplementation, hence this study was attempted and the results showed that combing green tea with Tai Chi and yogic practices would be more beneficial than isolated Tai Chi and yogic practices among obese men.

The findings of this study further proved that effect of Tai Chi and yogic practices with and without green tea supplementation were significantly better than control group in improving muscular strength among obese men and were in agreement with the previous researches cited.

4.3.2 RESULTS ON MUSCULAR ENDURANCE

The descriptive statistics on obtained data on muscular endurance due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of obese men are presented in Table VII.

TABLE VII
DESCRIPTIVE STATISTICS SHOWING MEAN AND STANDARD DEVIATION ON INITIAL, FINAL AND ADJUSTED MEANS ON MUSCULAR ENDURANCE

	TC Group	TCwGT Group	YA Group	YAwGT Group	Control Group
Pre Test Mean	10.87	10.80	10.27	10.93	11.67
Std Dev	1.60	1.26	2.05	1.49	2.50
Post Test Mean	13.40	14.07	11.67	12.73	11.67
Std Dev	1.59	1.16	2.05	1.28	2.50
Adjusted Post Test Mean	13.43	14.15	12.16	12.71	10.15

As shown in Table VII, the pre test mean on muscular endurance of TC group was10.87 with standard deviation $\pm$1.60 pre test mean of TCwGT group being 10.80 with standard deviation $\pm$ 1.26, the pre test mean of YA group being 10.27 with standard deviation $\pm$ 2.05, the pre test mean of YAwGT group being 10.93 with standard deviation $\pm$1.49 the pre test mean of control group being 11.67 with standard deviation $\pm$ 2.50.

The results presented in Table VII, show that the post test mean on muscular endurance of TC group is 13.40 with standard deviation $\pm$ 1.59 post test mean of TCwGT group being 14.07 with standard deviation $\pm$ 1.16, the post test mean of YA group being 11.67 with standard deviation $\pm$ 1.16, the post test mean of YAwGT

group being 12.73with standard deviation ±1.28and control group being 10.73 with standard deviation ± 2.91.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on muscular endurance on TC group was 13.43, TCwGT group was 14.15, YA group was 12.16 YAwGT group was 12.71 and control group was 10.15.

The statistical analysis comparing the initial and final means of muscular endurance due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of muscular endurance is presented in Table VIII.

TABLE VIII
COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA ON MUSCULAR ENDURANCE

	SOV	Sum of Squares	DF	Mean Squares	Obtained 'F'
Pre Test Mean	**B**	15.01	4	3.75	1.12
	W	235.33	70	3.36	
Post Test Mean	**B**	106.99	4	26.75	7.88*
	W	237.73	70	3.40	
Adjusted Post Test Mean	**B**	136.41	4	34.10	24.16*
	W	97.39	69	1.41	

SOV: Source of Variance; B: Between W: Within
Required $F_{(0.05),(df\ 4,70)} = 2.50$ $F_{(0.05),(df\ 4,69)} = 2.50$
* Significant at 0.05 level of confidence

The obtained F ratio of 1.12 on pre test means on muscular endurance of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

The obtained F ratio of 7.88 on post test means on muscular endurance of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was significant difference in the means of the groups after the experimental treatments.

The obtained F value on adjusted means on muscular endurance was 24.16. The obtained F value was greater than the required value of 2.58 and hence it was accepted that there was significant differences among the adjusted means on the muscular endurance of the subjects.

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

TABLE IX

MULTIPLE COMPARISONS BETWEEN TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA AND CONTROL GROUPS AND SCHEFFE'S POST HOC ANALYSIS ON MUSCULAR ENDURANCE

TC group	TCwGT Group	YA Group	YAwGT Group	Control Group	MEAN DIFF	C.I
13.43	14.15				0.72	1.39
13.43		12.16			1.27	1.39
13.43			12.71		0.72	1.39
13.43				10.15	3.28*	1.39
	14.15	12.16			1.99*	1.39
	14.15		12.71		1.44*	1.39
	14.15			10.15	4.00*	1.39
		12.16	12.71		0.55	1.39
		12.16		10.15	2.01*	1.39
			12.71	10.15	2.57*	1.39

***** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were greater than required confidence interval of 1.39.

Tai Chi without Green tea Vs Control Group MD3.28

Tai Chi with Green tea Vs Yoga without green tea MD 1.99

Tai Chi with Green tea Vs Yoga with green tea MD 1.44

Tai Chi with Green tea Vs Control Group MD4.00

Yoga without green tea Vs Control Group MD 2.01

Yoga with green tea Vs Control Group MD 2.57

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were less than required confidence interval of 1.39.

Tai Chi without Green tea Vs Tai Chi with Green Tea MD: 0.72

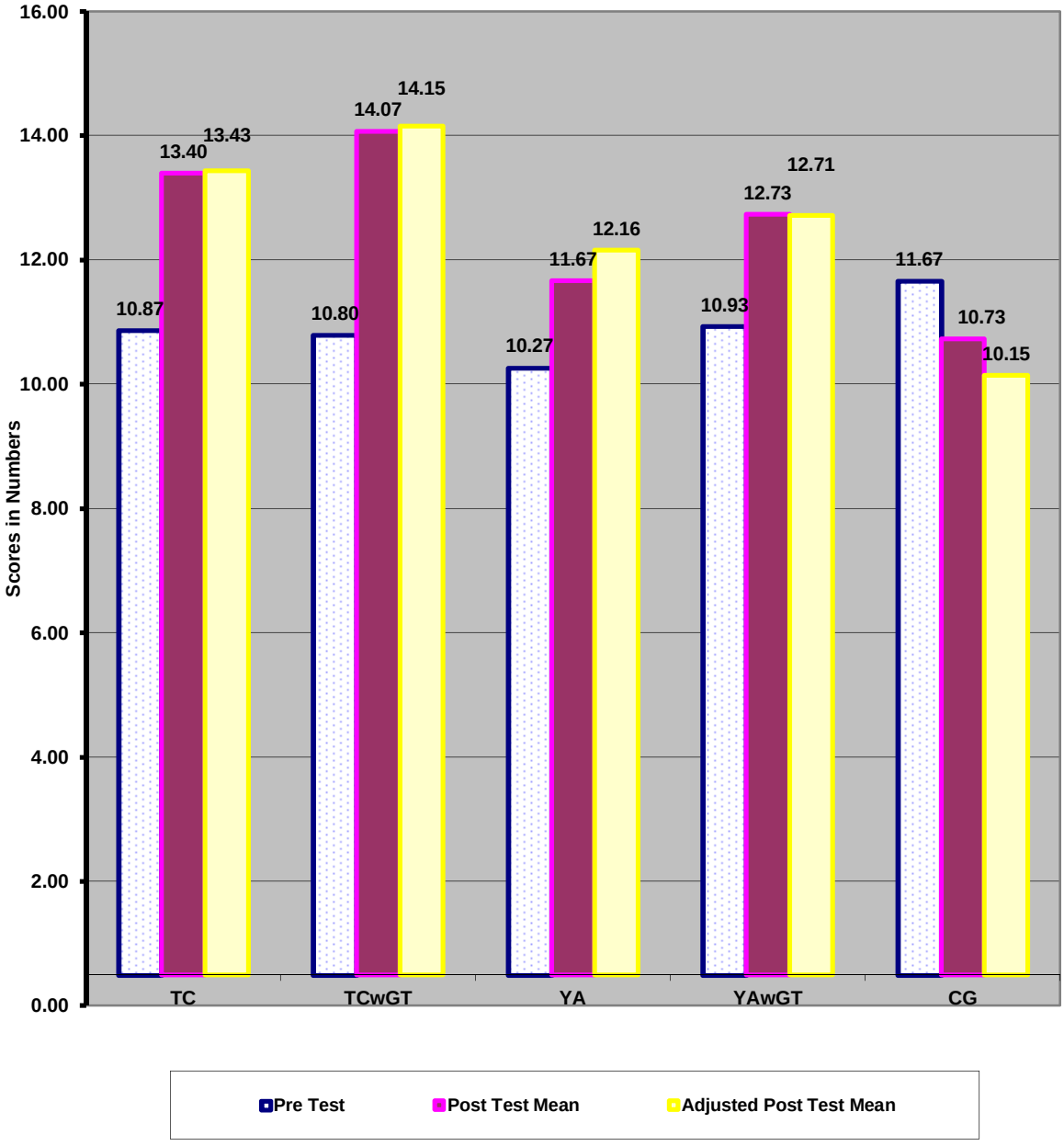
Tai Chi without Green Tea Vs Yoga without green tea Group MD 1.27

Tai Chi without Green Tea Vs Yoga with green tea group MD 0.72

Yoga without green tea Vs Yoga with Green tea MD 0.55

The pre test, post test and ordered adjusted means are presented through line graph for better understanding of the results of this study in Figure 2.

FIGURE 2
BAR DIAGRAM SHOWING PRE, POST AND ADJUSTED MEANS ON MUSCULAR ENDURANCE



4.3.2.1 DISCUSSION ON FINDINGS ON MUSCULAR ENDURANCE

The analysis of covariance due to effects of experimental treatments, namely, Tai Chi without green tea supplementation (TC), Tai Chi with green tea supplementation (TCwGT), yoga without green tea supplementation (YA) and yoga with green tea supplementation (YAwGT) on muscular endurance is presented in Table VIII. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 24.16 was greater than the required table value to be significant at 0.05 level. Thus, the results proved that there were significant improvements on muscular endurance due to 12 weeks experimental treatment among obese men.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results presented in Table IX. The adjusted means of TC 13.43, TCwGT 14.15, YA 12.16 and YAwGT 12.71 were greater that mean of CG 10.15, on muscular endurance among obese men. It was also proved that paired adjusted mean comparisons between TC and control group (CG), TCwGT and CG, YA and CG, YAwGT and CG were significant. And the results proved that comparing to control group all the four experimental treatments significantly improved muscular endurance among obese men. The comparisons of differences among experimental groups results presented proved that TC and TCwGT were significantly greater than YA and YAwGT in improving muscular endurance of obese men. And there was no significant difference between TC and TCwGT, TC and YAwGT, YA and YAwGT on muscular endurance among obese men. Thus, it was proved that adding green tea supplementation either with Tai Chi or yoga would give more beneficial effect on muscular endurance among obese men.

Chenchen et al. (2004) studied the physical and psychological effects of Tai Chi and found that is significantly increased the balance and strength, cardiovascular and respiratory function, flexibility, immune system, symptoms of arthritis, muscular strength, and psychological effects. Zachary and Shi (2007) investigated the efficacy of 12 weeks of Tai Chi practice and noted that it significantly increased the lower limb muscular strength and strength ratios in an older population.

Chen, et al., (2009) investigated the effect of yoga exercise intervention and determined that it had significant difference on muscular strength in school age asthmatic children. Shankardayalan (1996) investigated the effect of yogic exercise and determined that it significantly improved the muscular performance and body composition in adult males. Shirley Telles, et al., (2009) investigated the short term health impact of a yoga and diet change programme and noted that it significantly increased the muscular grip strength on obesity.

Chung, et al., (2008) investigated the effect of green tea extract (GTE) on obese women and to explore the relationship between GTE and obesity-related hormone peptides and showed that no statistical difference existed in % reduction in body weight, body mass index between the GTE and placebo groups after 12 weeks of treatment. Daniela, et al., (2005) investigated the effect of the addition of two cups of green tea GT (containing approximately 250 mg of total catechins) to a controlled diet in a group of healthy volunteers and suggested the ability of GT, consumed within a balanced controlled diet, to improve overall the antioxidative status and to protect against oxidative damage in humans.

The theoretical foundations proved that isolated Tai Chi, yogic practice and green tea supplementation contributed to the benefit of physical fitness and biochemical variables. However, there was scarcity of researches comparing effects

of Tai Chi and yogic practices with and without green tea supplementation, hence this study was attempted and the results showed that combing green tea with Tai Chi and yogic practices would be beneficial compared with isolated Tai Chi and yogic practices among obese men.

4.3.3 RESULTS ON FLEXIBILITY

The descriptive statistics on obtained data on flexibility due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of obese men is presented in Table X.

TABLE X

DESCRIPTIVE STATISTICS SHOWING MEAN AND STANDARD DEVIATION ON INITIAL, FINAL AND ADJUSTED MEANS ON FLEXIBILITY

	TC Group	TCwGT Group	YA Group	YAwGT Group	Control Group
Pre Test Mean	6.33	6.20	6.27	6.20	6.13
Std Dev	1.35	1.52	1.79	1.52	1.46
Post Test Mean	8.07	8.60	7.47	8.60	6.13
Std Dev	1.62	1.68	1.79	1.68	1.46
Adjusted Post Test Mean	7.97	8.62	7.43	8.62	6.28

As shown in Table X, the pre test mean on flexibility of TC group being 6.33 with standard deviation $\pm$1.35 pre test mean of TCwGT group being 6.20 with standard deviation $\pm$1.52, the pre test mean of YA group being 6.27 with standard deviation $\pm$1.79, the pre test mean of YAwGT group being 6.20 with standard deviation $\pm$1.52 the pre test mean of control group being 6.13 with standard deviation $\pm$1.46.

As per the results presented in Table X, the post test mean on flexibility of TC group was 8.07 with standard deviation $\pm$ 1.62 post test mean of TCwGT group being 8.60 with standard deviation $\pm$ 1.68, the post test mean of YA group being 7.47 with

standard deviation ± 1.68, the post test mean of YAwGT group being 8.60 with standard deviation ±1.68 and control group being 6.20 with standard deviation ±1.32.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on flexibility on TC group was 7.97, TCwGT group was 8.62, YA group was 7.43 YAwGT group was 8.62 and control group was 6.28.

The statistical analysis comparing the initial and final means of flexibility due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of flexibility is presented in Table XI.

TABLE XI
COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA ON FLEXIBILITY

	SOV	Sum of Squares	df	Mean Squares	Obtained F
Pre Test Mean	**B**	0.35	4	0.09	0.04
	W	164.80	70	2.35	
Post Test Mean	**B**	60.32	4	15.08	5.79*
	W	182.27	70	2.60	
Adjusted Post Test Mean	**B**	57.36	4	14.34	17.98*
	W	55.04	69	0.80	

SOV: Source of Variance; B: Between W: Within
Required $F_{(0.05),(df\ 4,70)} = 2.50$ $F_{(0.05),(df\ 4,69)} = 2.50$
* Significant at 0.05 level of confidence

The obtained F ratio of 0.04 on pre test means on flexibility of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was no significant difference in the means of the groups at initial stage.

The obtained F ratio of 5.79 on post test means on flexibility of the groups was not significant at 0.05 level as the obtained F value was less than the required Table F value of 2.58 to be significant at 0.05 level. This shows that there was significant difference in means of the groups after the experimental treatments.

The obtained F value on adjusted means on flexibility was 17.98. The obtained F value was greater than the required value of 2.58 and hence it was accepted that there were significant differences among the adjusted means on the flexibility of the subjects.

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

TABLE XII

Multiple Comparisons between Tai Chi Without Green Tea, Tai Chi With Green Tea, Yoga Without Tea, Yoga With Green Tea and Control Groups and Scheffe's Post Hoc Analysis on Flexibility

TC group	TCwGT Group	YA Group	YAwGT Group	Control Group	MEAN DIFF	C.I
7.97	8.62				0.65	1.05
7.97		7.43			0.54	1.05
7.97			8.63		0.65	1.05
7.97				6.28	1.69*	1.05
	8.62	7.43			1.19*	1.05
	8.62		8.63		0.01	1.05
	8.62			6.28	2.34*	1.05
		7.43	8.63		1.19*	1.05
		7.43		6.28	1.15*	1.05
			8.63	6.28	2.34*	1.05

***** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were greater than required confidence interval of 1.05.

Tai Chi without Green tea Vs Control Group MD1.69

Tai Chi with Green tea Vs Yoga without green tea MD 1.19

Tai Chi with Green tea Vs Control Group MD2.34

Yoga without green tea Vs Yoga with Green tea MD -1.19

Yoga without green tea Vs Control Group MD 1.15

Yoga with green tea Vs Control Group MD 2.34

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were less than the required confidence interval of 1.05.

Tai Chi without Green tea Vs Tai Chi with Green tea MD: -0.65

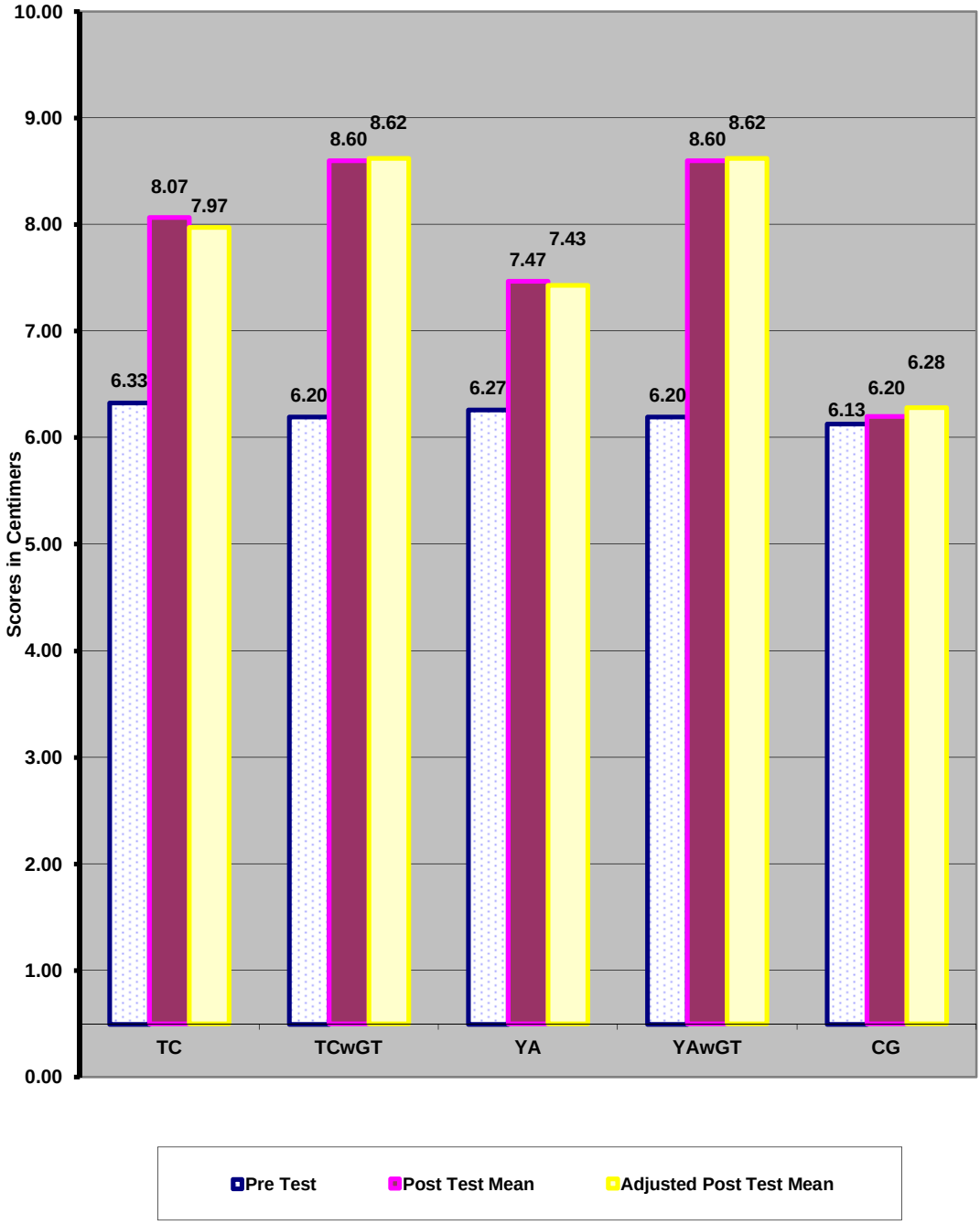
Tai Chi without Green tea Vs Yoga without green tea Group MD 0.54

Tai Chi without Green tea Vs Yoga with green tea group MD -0.65

Tai Chi with Green tea Vs Yoga with green tea MD 0.01

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure 3.

FIGURE 3
BAR DIAGRAM SHOWING PRE, POST AND ADJUSTED MEANS ON FLEXIBILITY



4.3.3.1 DISCUSSION ON FINDINGS ON FLEXIBILITY

The analysis of covariance due to effects of experimental treatments, namely Tai Chi without green tea supplementation (TC), Tai Chi with green tea supplementation (TCwGT), yoga without green tea supplementation (YA) and yoga with green tea supplementation (YAwGT) on flexibility was presented in Table XI.The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 17.98 was greater than the required table value to be significant at 0.05 level. Thus, the results proved that there were significant improvements on flexibility due to 12 weeks experimental treatment among obese men.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results presented in Table XII. The adjusted means of TC 7.97, TCwGT 8.62, YA 7.43 and YAwGT 8.62 were greater that mean of CG 6.28, on flexibility among obese men. It was also proved that paired adjusted mean comparisons between TC and control group (CG), TCwGT and CG, YA and CG, YAwGT and CG were significant. And the results proved that comparing to control group all the four experimental treatments significantly improved flexibility among obese men. The comparisons of differences among experimental groups results presented proved that TC was found to be better than YA and TCwGT was found to be better than YA and YAwGT. And there was no significant difference between TC and TCwGT, TC and YAwGT, and YA and YAwGT on flexibility among obese men. Thus, it was proved that green tea supplementation either with Tai Chi would give more beneficial effect on flexibility among obese men.

Chenchen et. al., (2004) conducted a studyon the physical and psychological effects of Tai Chi and found that it significantly increased the balance and strength,

cardiovascular and respiratory function, flexibility, immune system, symptoms of arthritis, muscular strength, and psychological effects. Zachary and Shi (2007) investigated the efficacy of 12 weeks of Tai Chi practice and determined that is significantly increased the lower limb muscular strength and strength ratios in an older population.

Chen, et al., (2009) investigated the effect of yoga exercise intervention and noted that there was significant difference on muscular strength in school age asthmatic children. Shankardayalan (1996) investigated the effect of yogic exercise and determined that is significantly improved the muscular performance and body composition in adult male. Shirley Telles, et al., (2009) investigated the short term health impact of a yoga and diet change programme and showed that is significantly increased the muscular grip strength on obesity. Chung, et al., (2008) investigated the effect of green tea extract (GTE) on obese women and explored the relationship between GTE and obesity-related hormone peptides and showed no statistical difference in % reduction in body weight, body mass index between the GTE and placebo groups after 12 weeks of treatment. Daniela, et al., (2005) investigated the effect of the addition of two cups of green tea GT to a controlled diet in a group of healthy volunteers and suggested the ability of GT, consumed within a balanced controlled diet, to improved overall antioxidative status and to protect against oxidative damage in humans.

The theoretical foundations proved that isolated Tai Chi, yogic practice and green tea supplementation contributed to the benefit of physical fitness and biochemical variables. However, there was scarcity of researches comparing effects of Tai Chi and yogic practices with and without green tea supplementation, hence this study was attempted and the results showed that combing green tea with Tai Chi and

yogic practices would be beneficial compare with isolated Tai Chi and yogic practices among obese men.

4.3.4 RESULTS ON CARDIO RESPIRATORY ENDURANCE

The descriptive statistics on obtained data on cardio respiratory endurance due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of obese men are presented in Table XIII.

TABLE XIII

DESCRIPTIVE STATISTICS SHOWING MEAN AND STANDARD DEVIATION ON INITIAL, FINAL AND ADJUSTED MEANS ON CARDIO RESPIRATORY ENDURANCE

	TC Group	TCwGT Group	YA Group	YAwGT Group	Control Group
Pre Test Mean	1950.67	1950.67	1915.40	1946.67	1990.00
Std Dev	179.02	179.02	201.76	157.51	166.26
Post Test Mean	2147.33	2170.00	1976.67	2034.67	1990.00
Std Dev	170.73	148.85	201.76	171.21	166.26
Adjusted Post Test Mean	2147.34	2170.01	2001.58	2037.50	1982.16

As shown in Table XIII, the pre test mean on cardio respiratory endurance of TC group being 1950.67 with standard deviation ±179.02 pre test mean of TCwGT group being 1950.67 with standard deviation ± 179.02, the pre test mean of YA group being 1915.40 with standard deviation ± 201.76, the pre test mean of YAwGT group being 1946.67 with standard deviation ±157.51, and the pre test mean of control group being 1990.00 with standard deviation ± 166.26.

The results presented in Table XIII show that the post test mean on cardio respiratory endurance of TC group was 2147.33 with standard deviation ± 170.73, post test mean of TCwGT group being 2170.00 with standard deviation ± 148.85, the post test mean of YA group being 1976.67 with standard deviation ± 148.85, the post test mean of YAwGT group being 2034.67 with standard deviation ±171.21and control group being 2009.93 with standard deviation ± 169.62.

Taking into consideration the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on cardio respiratory endurance on TC group was 2147.34, TCwGT group was 2170.01, YA group was 2001.58 YAwGT group was 2037.50 and control group was 1982.16.

The statistical analysis comparing the initial and final means of cardio respiratory endurance due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of cardio respiratory endurance is presented in Table XIV.

TABLE XIV
COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA ON CARDIO RESPIRATORY ENDURANCE

	SOV	Sum of Squares	df	Mean Squares	Obtained F
Pre Test Mean	**B**	42102.72	4	10525.68	0.33
	W	2201603.60	70	31451.48	
Post Test Mean	**B**	442830.19	4	110707.55	3.99*
	W	1940180.93	70	27716.87	
Adjusted Post Test Mean	**B**	441067.64	4	110266.91	9.04*
	W	842048.73	69	12203.60	

SOV: Source of Variance; B: Between W: Within
Required $F_{(0.05),(df\ 4,\ 70)} = 2.50$ $F_{(0.05),(df\ 4,\ 69)} = 2.50$
* Significant at 0.05 level of confidence

The obtained F ratio of 0.33 on pre test means on cardio respiratory endurance of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

The obtained F ratio of 3.99 on post test means on cardio respiratory endurance of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was significant difference in means of the groups after the experimental treatments.

The obtained F value on adjusted means on cardio respiratory endurance was 9.04. The obtained F value was greater than the required value of 2.58 and hence it was accepted that there was significant differences among the adjusted means on the cardio respiratory endurance of the subjects.

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

TABLE XV

MULTIPLE COMPARISONS BETWEEN TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA AND CONTROL GROUPS AND SCHEFFE'S POST HOC ANALYSIS ON CARDIO RESPIRATORY ENDURANCE

TC group	TCwGT Group	YA Group	YAwGT Group	Control Group	MEAN DIFF	C.I
2147.34	2170.01				22.67	129.58
2147.34		2001.58			145.76*	129.58
2147.34			2037.50		109.84	129.58
2147.34				1982.16	165.18*	129.58
	2170.01	2001.58			168.43*	129.58
	2170.01		2037.50		132.51*	129.58
	2170.01			1982.16	187.85*	129.58
		2001.58	2037.50		35.92	129.58
		2001.58		1982.16	19.42	129.58
			2037.50	1982.16	55.34	129.58

***** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were greater than the required confidence interval of 129.58.

Tai Chi without Green tea Vs Yoga without green tea Group MD 145.76

Tai Chi without Green tea Vs Control Group MD165.18

Tai Chi with Green tea Vs Yoga without green tea MD 168.43

Tai Chi with Green tea Vs Yoga with green tea MD 132.51

Tai Chi with Green tea Vs Control Group MD187.85

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were less than the required confidence interval of 129.58

Tai Chi without Green tea Vs Tai Chi with Green tea MD: -22.67

Tai Chi without Green tea Vs Yoga with green tea group MD 109.84

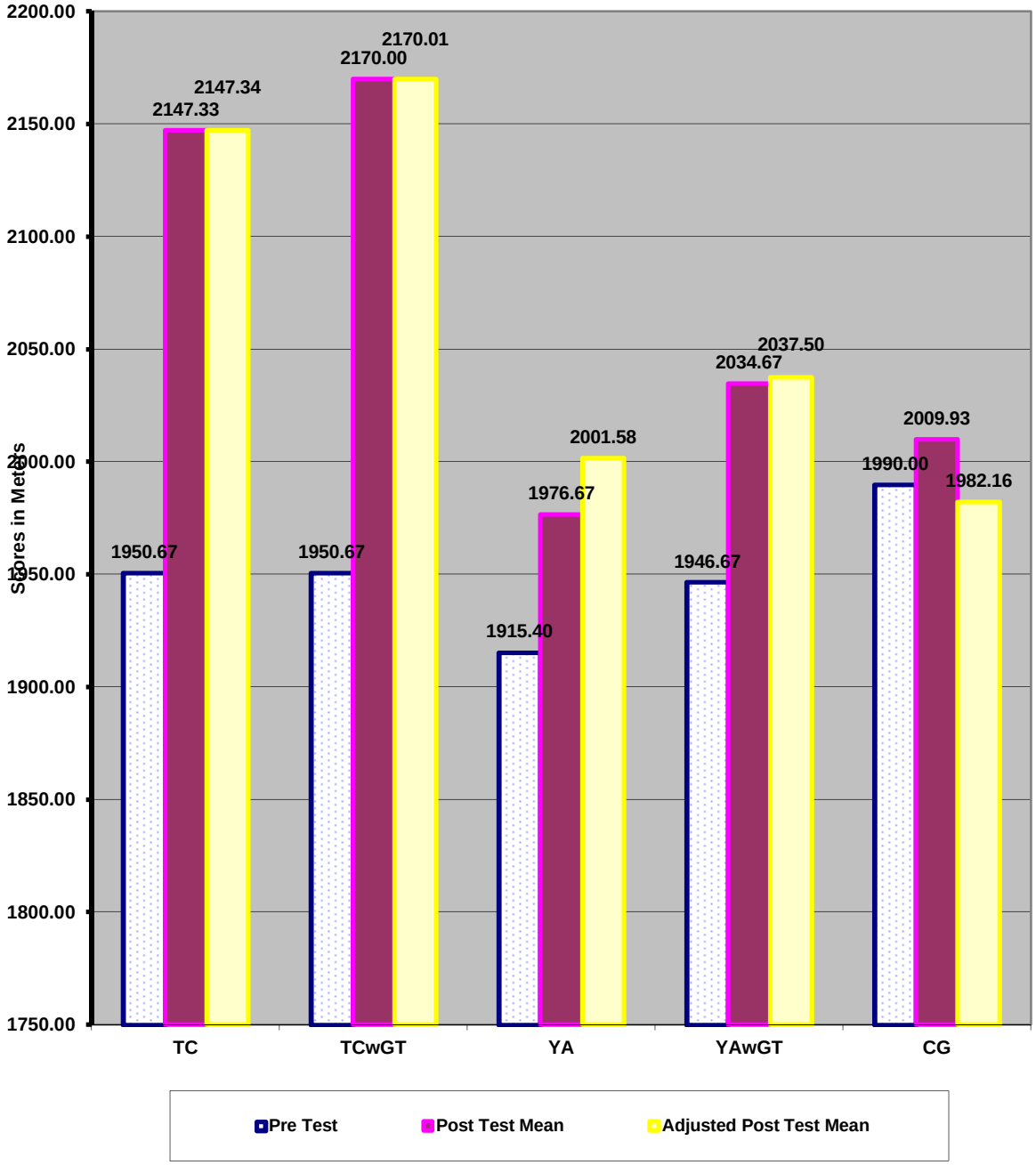
Yoga without green tea Vs Yoga with Green tea MD -35.92

Yoga without green tea Vs Control Group MD 19.42

Yoga with green tea Vs Control Group MD 55.34

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure 4.

FIGURE 4
BAR DIAGRAM SHOWING PRE, POST AND ADJUSTED MEANS ON CARDIO RESPIRATORY ENDURANCE



4.3.4.1 DISCUSSION ON FINDINGS ON CARDIO RESPIRATORY ENDURANCE

The analysis of covariance due to effects of experimental treatments, namely Tai Chi without green tea supplementation (TC), Tai Chi with green tea supplementation (TCwGT), yoga without green tea supplementation (YA) and yoga with green tea supplementation (YAwGT) on cardio respiratory endurance was presented in Table XIV. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 9.04 was greater than the required table value to be significant at 0.05 level. Thus, the results proved that there were significant improvements on cardio respiratory endurance due to 12 weeks experimental treatment among obese men.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results presented in Table XV. The adjusted means of TC 2147.34, TCwGT 2170.01, YA 2001.58 and YAwGT 2037.50 were greater that mean of CG 1982.16, on cardio respiratory endurance among obese men. It was also proved that paired adjusted mean comparisons between TC and control group (CG), TCwGT and CG, were significant. And the results proved that comparing to control group Though YA and YAwGT improved cardio respiratory endurance of obese men, the improvements were not significant. The comparisons of differences among experimental groups results presented proved that TC was better than YA, TCwGT was better than YA and YAwGT, and there was no significant difference between TC and TCwGT, TC and YAwGT, YA and YAwGT on cardio respiratory endurance among obese men. Thus, it was proved that adding green tea supplementation either with Tai Chi or yoga would give more beneficial effect on cardio respiratory endurance among obese men.

Chenchen et al. (2004) conducted a study on the physical and psychological effects of Tai Chi and found that it significantly increased the balance and strength, cardiovascular and respiratory function, flexibility, immune system, symptoms of arthritis, muscular strength, and psychological effects. Zachary and Shi (2007) investigated the efficacy of 12 weeks of Tai Chi practice and noted that it significantly increased the lower limb muscular strength and strength ratios in an older population.

Chen, et al., (2009) investigated the effect of yoga exercise intervention and observed that it showed significant difference on muscular strength in school age asthmatic children. Shankardayalan (1996) investigated the effect of yogic exercise and noted that it significantly improved the muscular performance and body composition in adult males. Shirley Telles, et al., (2009) investigated the short term health impact of a yoga and diet change programme and showed that it significantly increased the muscular grip strength on obesity.

Chung, et al., (2008) investigated the effect of green tea extract (GTE) on obese women and to explore the relationship between GTE and obesity-related hormone peptides and showed that no statistical difference existed in % reduction in body weight, body mass index between the GTE and placebo groups after 12 weeks of treatment. Daniela, et al., (2005) investigated the effect of the addition of two cups of green tea GT (containing approximately 250 mg of total catechins) to a controlled diet in a group of healthy volunteers and suggested the ability of GT, consumed within a balanced controlled diet, to improve overall the antioxidative status and to protect against oxidative damage in humans.

The theoretical foundations proved that isolated Tai Chi, yogic practice and green tea supplementation contributed to the benefit of physical fitness and biochemical variables. However, there was scarcity of researches comparing effects

of Tai Chi and yogic practices with and without green tea supplementation, hence this study was attempted and the results showed that combining green tea with Tai Chi and yogic practices had insignificant effect on cardio respiratory endurance among obese men.

4.3.5 RESULTS ON BODY MASS INDEX

The descriptive statistics on obtained data on body mass index due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of obese men are presented in Table XVI.

TABLE XVI

DESCRIPTIVE STATISTICS SHOWING MEAN AND STANDARD DEVIATION ON INITIAL, FINAL AND ADJUSTED MEANS ON BODY MASS INDEX

	TC Group	TCwGT Group	YA Group	YAwGT Group	Control Group
Pre Test Mean	32.73	32.49	32.51	32.85	32.49
Std Dev	2.03	1.53	1.69	1.93	1.34
Post Test Mean	31.45	29.31	31.43	31.21	32.49
Std Dev	2.71	1.36	1.69	2.91	1.34
Adjusted Post Test Mean	31.33	29.44	31.53	30.97	32.03

As shown in Table XVI, the pre test mean on body mass index of TC group being 32.73 with standard deviation $\pm$2.03 pre test mean of TCwGT group being 32.49 with standard deviation $\pm$ 1.53, the pre test mean of YA group being 32.51 with standard deviation $\pm$ 1.69, the pre test mean of YAwGT group being 32.85 with standard deviation $\pm$1.93 the pre test mean of control group being 32.49 with standard deviation $\pm$ 1.34.

The results presented in Table XVI, the post test mean on body mass index of TC group being 31.45 with standard deviation $\pm$ 2.71 post test mean of TCwGT group being 29.31 with standard deviation $\pm$ 1.36, the post test mean of YA group being 31.43with standard deviation $\pm$ 1.36, the post test mean of YAwGT group being 31.21

with standard deviation ±2.91and control group being 31.91 with standard deviation ± 0.94.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on body mass index on TC group was 31.33, TCwGT group was 29.44, YA group was 31.53 YAwGT group was 30.97 and control group was 32.03.

The statistical analysis comparing the initial and final means of body mass index due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of body mass index is presented in Table XVII.

TABLE XVII
COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA ON BODY MASS INDEX

	SOV	Sum of Squares	DF	Mean Squares	Obtained 'F'
Pre Test Mean	**B**	1.62	4	0.40	0.14
	W	207.69	70	2.97	
Post Test Mean	**B**	61.45	4	15.36	3.60*
	W	298.81	70	4.27	
Adjusted Post Test Mean	**B**	58.15	4	14.54	12.95*
	W	77.48	69	1.12	

SOV: Source of Variance; B: Between W: Within
Required $F_{(0.05),(df\,4,70)} = 2.50$ $F_{(0.05),(df\,4,69)} = 2.50$
* Significant at 0.05 level of confidence

The obtained F ratio of 0.14 on pre test means on body mass index of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was no significant difference in the means of the groups at initial stage.

The obtained F ratio of 3.60 on post test means on body mass index of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was significant difference in the means of the groups after the experimental treatments.

The obtained F value on adjusted means on body mass index was 12.95. The obtained F value was greater than the required value of 2.58 and hence it was accepted that there were significant differences among the adjusted means on the body mass index of the subjects.

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

TABLE XVIII

Multiple Comparisons between Tai Chi Without Green Tea, Tai Chi With Green Tea, Yoga Without Tea, Yoga With Green Tea and Control Groups and Scheffe's Post Hoc Analysis on Body Mass Index

TC group	TCwGT Group	YA Group	YAwGT Group	Control Group	MEAN DIFF	C.I
31.33	29.44				1.89*	1.24
31.33		31.53			0.20	1.24
31.33			30.97		0.36	1.24
31.33				32.03	0.70	1.24
	29.44	31.53			2.09*	1.24
	29.44		30.97		1.53*	1.24
	29.44			32.03	2.59*	1.24
		31.53	30.97		0.56	1.24
		31.53		32.03	0.50	1.24
			30.97	32.03	1.06	1.24

***** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were greater than required confidence interval of 1.24.

Tai Chi without Green tea Vs Tai Chi with Green tea MD:1.89

Tai Chi with Green tea Vs Yoga without green tea MD -2.09

Tai Chi with Green tea Vs Yoga with green tea MD -1.53

Tai Chi with Green tea Vs Control Group MD-2.59

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were less than the required confidence interval of 1.24.

Tai Chi without Green tea Vs Yoga without green tea Group MD -0.20

Tai Chi without Green tea Vs Yoga with green tea group MD 0.36

Tai Chi without Green tea Vs Control Group MD -0.70

Yoga without green tea Vs Yoga with Green tea MD 0.56

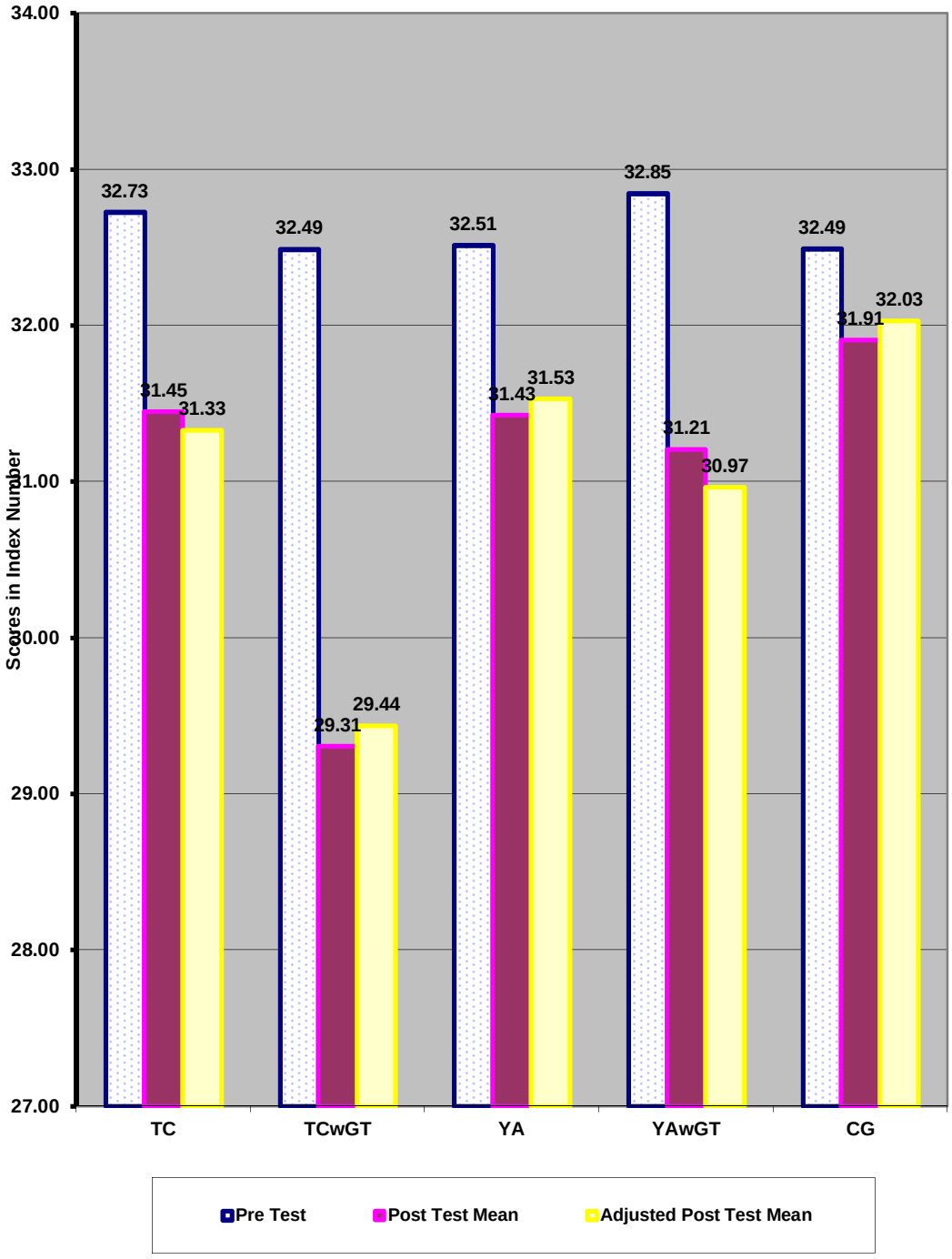
Yoga without green tea Vs Control Group MD -0.50

Yoga with green tea Vs Control Group MD -1.06

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure 5.

FIGURE 5

BAR DIAGRAM SHOWING PRE, POST AND ADJUSTED MEANS ON BODY MASS INDEX



4.3.5.1 DISCUSSION ON FINDINGS ON BODY MASS INDEX

The analysis of covariance due to effects of experimental treatments, namely Tai Chi without green tea supplementation (TC), Tai Chi with green tea supplementation (TCwGT), yoga without green tea supplementation (YA) and yoga with green tea supplementation (YAwGT) on body mass index was presented in Table XVII. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 12.95 was greater than the required table value to be significant at 0.05 level. Thus, the results proved that there were significant improvements on body mass index due to 12 weeks experimental treatment among obese men.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results presented in Table XVIII. The adjusted means of TC 31.33, TCwGT 29.44, YA 31.53 and YAwGT 30.97 were lesser than mean of CG 32.03, which proved all the four experimental treatments influenced body mass index among obese men. The extent of statistical significance of the influences were analysed through paired adjusted means. The comparisons between TCwGI and control group (CG) was found to be significant at 0.05 level. The comparisons of differences among experimental groups results presented proved that TCwGT was significantly better than TC, YA and YAwGT in influencing body mass index of obese men. Thus, it was proved that adding green tea supplementation either with Tai Chi or yoga would give more beneficial effect on body mass index among obese men.

Joanna Suliburska, et al., (2012) investigated the effects of green tea extract on the mineral, body mass, lipid profile, glucose, and antioxidant status of obese patients. The present findings demonstrate that green tea influences the body's mineral status. Moreover, the results of this study confirm the beneficial effects of green tea extract

supplementation on body mass index, lipid profile, and total antioxidant status in patients with obesity.

Chenchen et al. (2004) conducted the physical and psychological effects of Tai Chi and found that it significantly increased the balance and strength, cardiovascular and respiratory function, flexibility, immune system, symptoms of arthritis, muscular strength, and psychological effects. Zachary and Shi (2007) investigated the efficacy of 12 weeks of Tai Chi practice and noted that it significantly increased the lower limb muscular strength and strength ratios in an older population.

Chen, et al., (2009) investigated the effect of yoga exercise intervention and showed that significant difference existed on muscular strength in school age asthmatic children. Shankardayalan (1996) investigated the effect of yogic exercise and determined that it significantly improved the muscular performance and body composition in adult male. Shirley Telles, et al., (2009) investigated the short term health impact of a yoga and diet change programme and that showed significantly increased the muscular grip strength on obesity.

Chung, et al., (2008) investigated the effect of green tea extract (GTE) on obese women and to explore the relationship between GTE and obesity-related hormone peptides and showed no statistical difference in % reduction in body weight, body mass index between the GTE and placebo groups after 12 weeks of treatment. Daniela, et al., (2005) investigated the effect of the addition of two cups of green tea GT (containing approximately 250 mg of total catechins) to a controlled diet in a group of healthy volunteers and suggested the ability of GT, consumed within a balanced controlled diet, to improve overall the antioxidative status and to protect against oxidative damage in humans.

The theoretical foundations proved that isolated Tai Chi, yogic practice and green tea supplementation had contributed to the benefit of physical fitness and biochemical variables. However, there was scarcity of researches comparing effects of Tai Chi and yogic practices with and without green tea supplementation, hence this study was attempted and the results showed that combing green tea with Tai Chi and yogic practices could be more beneficial than isolated Tai Chi and yogic practices among obese men.

The results of the study proved that yogi practices with green tea were significantly better than other experimental treatments, namely, Tai Chi with green tea and yogic practices.

4.3.6 RESULTS ON BLOOD SUGAR (FASTING)

The descriptive statistics on obtained data on blood sugar (Fasting) due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of obese men are presented in Table XIX.

TABLE XIX

DESCRIPTIVE STATISTICS SHOWING MEAN AND STANDARD DEVIATION ON INITIAL, FINAL AND ADJUSTED MEANS ON BLOOD SUGAR (FASTING)

	TC Group	TCwGT Group	YA Group	YAwGT Group	Control Group
Pre Test Mean	110.73	112.73	111.47	112.27	112.67
Std Dev	5.46	4.65	5.44	5.09	6.99
Post Test Mean	105.33	102.20	102.60	96.87	112.67
Std Dev	5.38	5.23	5.44	3.48	6.99
Adjusted Post Test Mean	106.38	101.56	103.03	96.62	113.15

As shown in Table XIX, the pre test mean on blood sugar (Fasting) of TC group being 110.73 with standard deviation $\pm$5.46 pre test mean of TCwGT group being 112.73 with standard deviation $\pm$ 4.65, the pre test mean of YA group being 111.47 with standard deviation $\pm$ 5.44, the pre test mean of YAwGT group being 112.27 with standard deviation $\pm$5.09 the pre test mean of control group being 112.67 with standard deviation $\pm$ 6.99.

The results presented in Table XIX, show that the post test mean on blood sugar (Fasting) of TC group was 105.33 with standard deviation $\pm$ 5.38 post test mean of TCwGT group was 102.20 with standard deviation $\pm$ 5.23, the post test mean of YA group was 102.60 with standard deviation $\pm$ 5.23, the post test mean of YAwGT

group was 96.87 with standard deviation ±3.48and control group was 113.73 with standard deviation ± 11.11.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on blood sugar (Fasting) on TC group was 106.38, TCwGT group was 101.56, YA group was 103.03 YAwGT group was 96.62 and control group was 113.15.

The statistical analysis comparing the initial and final means of blood sugar (Fasting) due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of blood sugar (Fasting) is presented in Table XX.

TABLE XX

COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA ON BLOOD SUGAR (FASTING)

	SOV	Sum of Squares	DF	Mean Squares	Obtained 'F'
Pre Test Mean	**B**	44.08	4	11.02	0.35
	W	2179.87	70	31.14	
Post Test Mean	**B**	2287.39	4	571.85	11.97*
	W	3344.00	70	47.77	
Adjusted Post Test Mean	**B**	2259.45	4	564.86	21.93*
	W	1777.12	69	25.76	

SOV: Source of Variance; B: Between W: Within

Required $F_{(0.05),\,(df\,4,70)} = 2.50$ $F_{(0.05),\,(df\,4,69)} = 2.50$

* Significant at 0.05 level of confidence

The obtained F ratio of 0.35 on pre test means on blood sugar (Fasting) of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

The obtained F ratio of 11.97 on post test means on blood sugar (Fasting) of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was significant difference in means of the groups after the experimental treatments.

The obtained F value on adjusted means on blood sugar (Fasting) was 21.93. The obtained F value was greater than the required value of 2.58 and hence it was accepted that there was significant differences among the adjusted means on the blood sugar (Fasting) of the subjects.

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

TABLE XXI

MULTIPLE COMPARISONS BETWEEN TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA AND CONTROL GROUPS AND SCHEFFE'S POST HOC ANALYSIS ON BLOOD SUGAR (FASTING)

TC group	TCwGT Group	YA Group	YAwGT Group	Control Group	MEAN DIFF	C.I
106.38	101.56				4.83	5.95
106.38		103.03			3.36	5.95
106.38			96.62		9.77*	5.95
106.38				113.15	6.76*	5.95
	101.56	103.03			1.47	5.95
	101.56		96.62		4.94	5.95
	101.56			113.15	11.59*	5.95
		103.03	96.62		6.41*	5.95
		103.03		113.15	10.12*	5.95
			96.62	113.15	16.53*	5.95

***** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were greater than required confidence interval of 5.95.

Tai Chi without Green tea Vs Yoga with green tea group MD 9.77

Tai Chi without Green tea Vs Control Group MD6.76

Tai Chi with Green tea Vs Control Group MD11.59

Yoga without green tea Vs Yoga with Green tea MD 6.41

Yoga without green tea Vs Control Group MD 10.12

Yoga with green tea Vs Control Group MD 16.53

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were less than required confidence interval of 5.95.

Tai Chi without Green tea Vs Tai Chi with Green tea MD: 4.83

Tai Chi without Green tea Vs Yoga without green tea Group MD 3.36

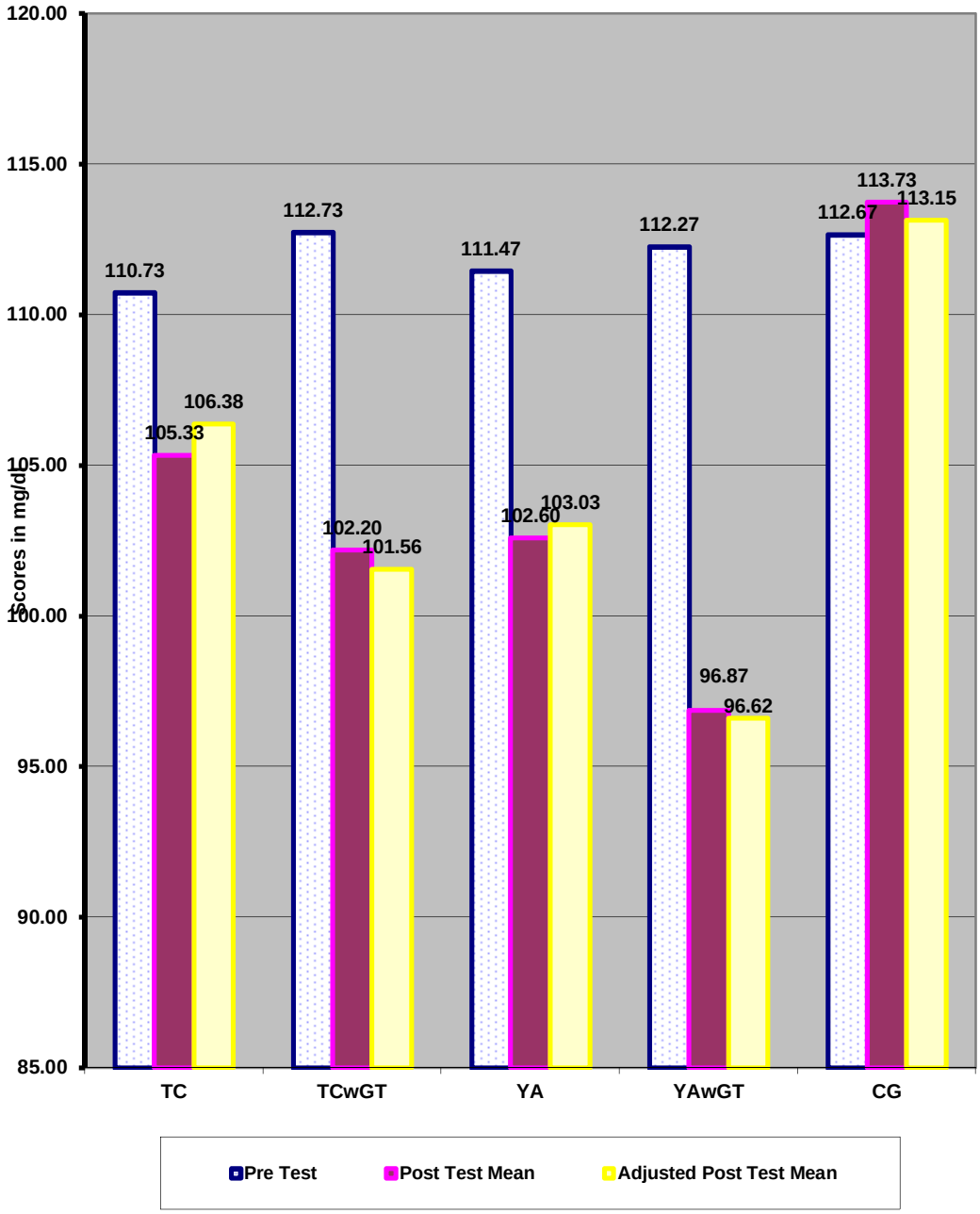
Tai Chi with Green tea Vs Yoga without green tea MD 1.47

Tai Chi with Green tea Vs Yoga with green tea MD 4.94

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure 6.

FIGURE 6

BAR DIAGRAM SHOWING PRE, POST AND ADJUSTED MEANS ON BLOOD SUGAR (FASTING)



4.3.6.1 DISCUSSION ON FINDINGS ON BLOOD SUGAR (FASTING)

The analysis of covariance due to effects of experimental treatments, namely, Tai Chi without green tea supplementation (TC), Tai Chi with green tea supplementation (TCwGT), yoga without green tea supplementation (YA) and yoga with green tea supplementation (YAwGT) on blood sugar (Fasting) was presented in Table XX. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 21.93 was greater than the required table value to be significant at 0.05 level. Thus, the results proved that there were significant improvements on blood sugar (Fasting) due to 12 weeks experimental treatment among obese men.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results presented in Table XXI. The adjusted means of TC 106.38, TCwGT 101.56, YA 103.03 and YAwGT 96.62 were greater that mean of CG 113.15, on blood sugar (Fasting) among obese men. It was also proved that paired adjusted mean comparisons between TC and control group (CG), TCwGT and CG, YA and CG, YAwGT and CG were significant. And the results proved that comparing to control group all the four experimental treatments significantly reduced blood sugar (Fasting) among obese men. The comparisons of differences among experimental groups results presented proved that YAwGT was significantly better than TC and YA groups in reducing blood sugar. And there was no significant difference between TC and TCwGT, TC and TCwGT, TCwGT and YA, and TCwGT and YAwGT onblood sugar (Fasting) among obese men.

Thus, it was found that YAwGT was significantly better than TC and YA in reducing blood sugar (Fasting) among obese men. Though adjusted mean of YGwGT was greater than mean of TCwGT the difference was not significant at 0.05 level.

Thus, it was proved that green tea supplementation with Tai Chi or yoga would give more beneficial effect on blood sugar (Fasting) among obese men.

Jen Chen Tsai, et al., (2003) investigated the effects on blood pressure, lipid profile, and anxiety status on subjects received a 12-week Tai Chi Chuan exercise programme and found that Tai Chi exercise training could decrease blood pressure and results in favorable lipid profile changes. Xiao Hong Pan, et al., (2016) investigated the effects of Tai Chi on blood lipid profiles in humans. Tai Chi exercise lowered blood TG level with a trend to decrease blood TC level. Yeting, et al. (2017) investigated the effect of Tai Chi exercise and found that Tai Chi exercise could decrease SBP, DBP, TG, LDL-C.

Pawel, et al., (2012) investigated the 56 obese, hypertensive subjects were randomized to receive a daily supplement of 1 capsule that contained either 379 mg of GT extract (GTE) or a matching placebo, for 3 months Supplementation also contributed to significant decreases in the total and low-density lipoprotein cholesterol and triglycerides, but an increase in high-density lipoprotein cholesterol. In conclusion, daily supplementation with 379 mg of GTE favorably influences blood pressure, insulin resistance, inflammation and oxidative stress, and lipid profile in patients with obesity-related hypertension.

Chinnasamy (1992) investigated the effects of asanas and physical exercise and found that it significantly decreased the blood sugar level among school boys. Damodaran, et al. (2002) investigated the effect of yoga and noted that significantly decreased the blood glucose on hypertensive patients. Dhananjai, et al., (2010) investigated the effect of a 12 weeks yoga practice determined that significantly decreased the plasma glucose among obese subjects. Hojjati and Shabani (2013)

investigated the effect of yoga training and showed that it significantly decreased the blood glucose in type II diabetic females.

The theoretical foundations proved that isolated Tai Chi, yogic practice and green tea supplementation contributed to the benefit of obese men in reducing blood glucose levels and other lipid profiles such as total cholesterol, LDL – C, HDL and triglycerides. However, there was scarcity of researches comparing effects of Tai Chi and yogic practices with and without green tea supplementation, hence this study was attempted and the results showed that combing green tea with Tai Chi and yogic practices would be benefical than isolated Tai Chi and yogic practices among obese men.

Thus, it was found that YAwGT was significantly better than TC and YA in reducing blood sugar (Fasting) among obese men. Though adjusted mean of YGwGT was greater than mean of TCwGT the difference was not significant at 0.05 level. Thus, it was proved that green tea supplementation with Tai Chi or yoga would give more beneficial effect on blood sugar (Fasting) among obese men.

4.3.7 RESULTS ON TOTAL CHOLESTEROL

The descriptive statistics on obtained data on total cholesterol due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of obese men are presented in Table XXII.

TABLE XXII

DESCRIPTIVE STATISTICS SHOWING MEAN AND STANDARD DEVIATION ON INITIAL, FINAL AND ADJUSTED MEANS ON TOTAL CHOLESTEROL

	TC Group	TCwGT Group	YA Group	YAwGT Group	Control Group
Pre Test Mean	213.53	212.40	211.13	213.40	219.87
Std Dev	17.80	19.17	15.13	9.99	14.02
Post Test Mean	207.87	197.27	204.40	194.47	219.87
Std Dev	15.72	14.98	15.13	4.81	14.02
Adjusted Post Test Mean	208.23	198.40	206.40	194.92	217.98

As shown in Table XXII, the pre test mean on total cholesterol of TC group being 213.53 with standard deviation $\pm$17.80 pre test mean of TCwGT group being 212.40 with standard deviation $\pm$19.17, the pre test mean of YA group being 211.13 with standard deviation $\pm$15.13, the pre test mean of YAwGT group being 213.40 with standard deviation $\pm$9.99 the pre test mean of control group being 219.87 with standard deviation $\pm$14.02.

The results presented in Table XXII, the post test mean on total cholesterol of TC group being 207.87 with standard deviation $\pm$15.72, post test mean of TCwGT

group being 197.27 with standard deviation ±14.98, the post test mean of YA group being 204.40 with standard deviation ±14.98, the post test mean of YAwGT group being 194.47 with standard deviation ±4.81 and control group being 221.93 with standard deviation ±7.50.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on total cholesterol on TC group was 208.23, TCwGT group was 198.40, YA group was 206.40 YAwGT group was 194.92 and control group was 217.98.

The statistical analysis comparing the initial and final means of total cholesterol due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of total cholesterol is presented in Table XXIII.

TABLE XXIII
COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA ON TOTAL CHOLESTEROL

	SOV	Sum of Squares	DF	Mean Squares	Obtained 'F'
Pre Test Mean	**B**	686.27	4	171.57	0.71
	W	16934.40	70	241.92	
Post Test Mean	**B**	6988.45	4	1747.11	11.92*
	W	10262.93	70	146.61	
Adjusted Post Test Mean	**B**	4789.33	4	1197.33	34.59*
	W	2388.42	69	34.61	

SOV: Source of Variance; B: Between W: Within
Required $F_{(0.05),\,(df\,4,70)} = 2.50$ $F_{(0.05),\,(df\,4,69)} = 2.50$
* Significant at 0.05 level of confidence

The obtained F ratio of 0.71 on pre test means on total cholesterol of the groups was not significant at 0.05 level as the obtained F value was less than the

required table F value of 2.58 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

The obtained F ratio of 11.92 on post test means on total cholesterol of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was significant difference in means of the groups after the experimental treatments.

The obtained F value on adjusted means on total cholesterol was 34.59. The obtained F value was greater than the required value of 2.58 and hence it was accepted that there was significant differences among the adjusted means on the total cholesterol of the subjects.

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

TABLE XXIV

MULTIPLE COMPARISONS BETWEEN TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA AND CONTROL GROUPS AND SCHEFFE'S POST HOC ANALYSIS ON TOTAL CHOLESTEROL

TC group	TCwGT Group	YA Group	YAwGT Group	Control Group	MEAN DIFF	C.I
208.23	198.40				9.83*	6.90
208.23		206.40			1.83	6.90
208.23			194.92		13.31*	6.90
208.23				217.98	9.75*	6.90
	198.40	206.40			8.00*	6.90
	198.40		194.92		3.48	6.90
	198.40			217.98	19.58*	6.90
		206.40	194.92		11.48*	6.90
		206.40		217.98	11.58*	6.90
			194.92	217.98	23.06*	6.90

***** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were greater than required confidence interval of 6.90.

Tai Chi without Green tea Vs Tai Chi with Green tea MD:9.83

Tai Chi without Green tea Vs Yoga with green tea group MD 13.31

Tai Chi without Green tea Vs Control Group MD 9.75

Tai Chi with Green tea Vs Yoga without green tea MD 8.00

Tai Chi with Green tea Vs Control Group MD19.58

Yoga without green tea Vs Yoga with Green tea MD 11.48

Yoga without green tea Vs Control Group MD 11.58

Yoga with green tea Vs Control Group MD 23.06

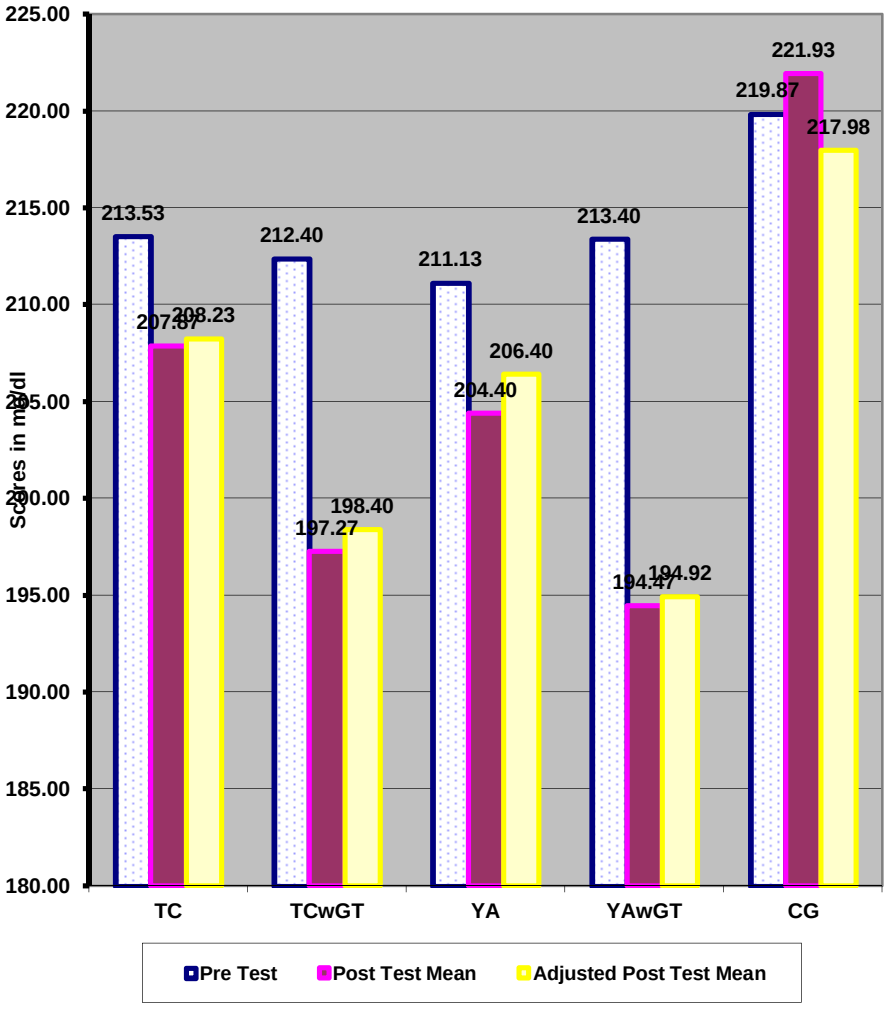
The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were less than the required confidence interval of 6.90

Tai Chi without Green Tea Vs Yoga without green tea Group MD 1.83

Tai Chi with Green Tea Vs Yoga with green tea MD 3.48

The pre test, post test and ordered adjusted means were presented through line graph for better understanding of the results of this study in Figure 7.

FIGURE 7
BAR DIAGRAM SHOWING PRE, POST AND ADJUSTED MEANS ON TOTAL CHOLESTEROL



4.3.7.1 DISCUSSION ON FINDINGS ON TOTAL CHOLESTEROL

The analysis of covariance due to effects of experimental treatments, namely Tai Chi without green tea supplementation (TC), Tai Chi with green tea supplementation (TCwGT), yoga without green tea supplementation (YA) and yoga with green tea supplementation (YAwGT) on total cholesterol is presented in Table XXIII. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 34.59 was greater than the required table F value to be significant at 0.05 level. Thus, the results proved that there were significant improvements on total cholesterol due to 12 weeks experimental treatment among obese men.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results are presented in Table XXIV. The adjusted means of TC 208.23, TCwGT 198.40, YA 206.40 and YAwGT 194.92 were greater that mean of CG 217.98, on total cholesterol among obese men. It was also proved that paired adjusted mean comparisons between TC and control group (CG), TCwGT and CG, YA and CG, YAwGT and CG were significant. And the results proved that comparing to control group all the four experimental treatments significantly reduced total cholesterol among obese men. The comparisons of differences among experimental groups results presented proved that TCwGT and YAwGT were significantly better than TC and YA groups in reducing total cholesterol among obese men.

Thus, it was found that though adjusted mean of YGwGT was greater than mean of TCwGT the difference was not significant at 0.05 level. Thus, it was proved that green tea supplementation with Tai Chi or yoga would give more beneficial effect on total cholesterol among obese men.

Xin Xin Zheng, et al., (2011) investigated to identify and quantify the effect of green tea and its extract on total cholesterol, LDL cholesterol, and HDL cholesterol and showed that the administration of green tea beverages or extracts resulted in significant reductions in serum TC and LDL-cholesterol concentrations, but no effect on HDL cholesterol was observed. Pawel, et al., (2012) investigated on 56 obese, hypertensive subjects being randomized to receive a daily supplement of 1 capsule that contained either 379 mg of GT extract (GTE) or a matching placebo, for 3 months Supplementation also contributed to significant decreases in the total and low-density lipoprotein cholesterol and triglycerides, but an increase in high-density lipoprotein cholesterol. In conclusion, daily supplementation with 379 mg of GTE favorably influenced blood pressure, insulin resistance, inflammation and oxidative stress, and lipid profile in patients with obesity-related hypertension.

Jen Chen Tsai, et al., (2003) investigated the effects on blood pressure, lipid profile, and anxiety status on subjects received a 12-week Tai Chi Chuan exercise programme and found Tai Chi exercise training could decrease blood pressure and resulted in favorable lipid profile changes. Xiao Hong Pan, et al., (2016) investigated the effects of Tai Chi on blood lipid profiles in humans. Tai Chi exercise lowered blood TG level with a trend to decrease blood TC level Yeting, et al., (2017) investigated the effect of Tai Chi exercise and found that Tai Chi exercise could decrease SBP, DBP, TG, LDL-C.

Ajay Pal, et al., (2011) investigated the effect of yogic practices and found that reduction of SBP, DBP, heart rate, body fat%, total cholesterol, triglycerides and LDL after regular yogic practices was beneficial for cardiac and hypertensive patients. Anjum Sayyed, et al., (2010) investigated the study of lipid profile and pulmonary functions in subjects participated in sudarshan kriya yoga and observed that it

significantly reduced the total cholesterol. Bhende, et al., (2011) investigated the effect of yogic practices and noted that it significantly decreased the total cholesterol on the management of hypertension in working women. Chidambara Raja (2012) investigated the effect of yogic practices and noted that it significantly decreased the total cholesterol among Annamalai University students. Chidambara Raja (2014) investigated the effect of yoga practices determined that significantly decreases the total cholesterol, triglycerides and uric acid among women diabetic patients.

The theoretical foundations proved that isolated Tai Chi, yogic practice and green tea supplementation had contributed to the benefit of selected biochemical variables. However, there was scarcity of researches comparing effects of Tai Chi and yogic practices with and without green tea supplementation, hence this study was attempted and the results showed that combing green tea with Tai Chi and yogic practices would be more beneficial than the isolated Tai Chi and yogic practices among obese men.

And the findings of this study were in agreement with the previous researches and it was found that combining green tea supplementation with yogic practices proved to be more beneficial for obese men in managing total cholesterol.

4.3.8 RESULTS ON HIGH DENSITY LIPOPROTEIN

The descriptive statistics on obtained data on high density lipoprotein due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of obese men are presented in Table XXV.

TABLE XXV

DESCRIPTIVE STATISTICS SHOWING MEAN AND STANDARD DEVIATION ON INITIAL, FINAL AND ADJUSTED MEANS ON HIGH DENSITY LIPOPROTEIN

	TC Group	TCwGT Group	YA Group	YAwGT Group	Control Group
Pre Test Mean	40.20	40.07	40.47	40.27	40.27
Std Dev	1.47	1.58	2.33	3.22	2.22
Post Test Mean	42.73	45.20	44.73	46.20	40.27
Std Dev	1.33	1.57	2.33	2.51	2.22
Adjusted Post Test Mean	42.77	45.31	44.60	46.19	40.06

As shown in Table XXV, the pre test mean on high density lipoprotein of TC group was40.20 with standard deviation $\pm$1.47, pre test mean of TCwGT group was 40.07 with standard deviation $\pm$1.58, pre test mean of YA group was 40.47 with standard deviation $\pm$2.33, pre test mean of YAwGT group was 40.27 with standard deviation $\pm$3.22 and the pre test mean of control group was 40.27 with standard deviation $\pm$2.22.

As per the results presented in Table XXV, the post test mean on high density lipoprotein of TC group was 42.73 with standard deviation $\pm$1.33 post test mean of

TCwGT group was 45.20 with standard deviation ±1.57, and the post test mean of YA group was 44.73 with standard deviation ±1.57, the post test mean of YAwGT group was 46.20 with standard deviation ±2.51 and that of control group was 40.07 with standard deviation ±2.46.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean of high density lipoprotein on TC group was 42.77, TCwGT group was 45.31, YA group was 44.60 YAwGT group was 46.19 and that of control group was 40.06.

The statistical analysis comparing the initial and final means of high density lipoprotein due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of high density lipoprotein is presented in Table XXVI.

TABLE XXVI

COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA ON HIGH DENSITY LIPOPROTEIN

	SOV	Sum of Squares	DF	Mean Squares	Obtained 'F'
Pre Test Mean	**B**	1.25	4	0.31	0.06
	W	354.93	70	5.07	
Post Test Mean	**B**	354.99	4	88.75	19.44*
	W	319.60	70	4.57	
Adjusted Post Test Mean	**B**	355.87	4	88.97	32.50*
	W	188.88	69	2.74	

SOV: Source of Variance; B: Between W: Within

Required $F_{(0.05),\,(df\,4,70)} = 2.50$ $F_{(0.05),\,(df\,4,69)} = 2.50$

* Significant at 0.05 level of confidence

The obtained F ratio of 0.06 on pre test means on high density lipoprotein of the groups was not significant at 0.05 level as the obtained F value was less than the

required table F value of 2.58 to be significant at 0.05 level. This shows that there was no significant difference in the means of the groups at initial stage.

The obtained F ratio of 19.44 on post test means on high density lipoprotein of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was no significant difference in the means of the groups after the experimental treatments.

The obtained F value on adjusted means on high density lipoprotein was 32.50. The obtained F value was greater than the required value of 2.58 and hence it was accepted that there were significant differences among the adjusted means on the high density lipoprotein of the subjects.

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

TABLE XXVII

MULTIPLE COMPARISONS BETWEEN TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA AND CONTROL GROUPS AND SCHEFFE'S POST HOC ANALYSIS ON HIGH DENSITY LIPOPROTEIN

TC group	TCwGT Group	YA Group	YAwGT Group	Control Group	MEAN DIFF	C.I
42.77	45.31				2.55*	1.94
42.77		44.60			1.84	1.94
42.77			46.19		3.43*	1.94
42.77				40.06	2.71*	1.94
	45.31	44.60			0.71	1.94
	45.31		46.19		0.88	1.94
	45.31			40.06	5.25*	1.94
		44.60	46.19		1.59	1.94
		44.60		40.06	4.55*	1.94
			46.19	40.06	6.13*	1.94

***** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were greater than the required confidence interval of 1.94.

Tai Chi without Green tea Vs Tai Chi with Green tea MD: 2.55

Tai Chi without Green tea Vs Yoga with green tea group MD 3.43

Tai Chi without Green tea Vs Control Group MD2.71

Tai Chi with Green tea Vs Control Group MD5.25

Yoga without green tea Vs Control Group MD 4.55

Yoga with green tea Vs Control Group MD 6.13

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were less than the required confidence interval of 1.94.

Tai Chi without Green tea Vs Yoga without green tea Group MD 1.84

Tai Chi with Green tea Vs Yoga without green tea MD 0.71

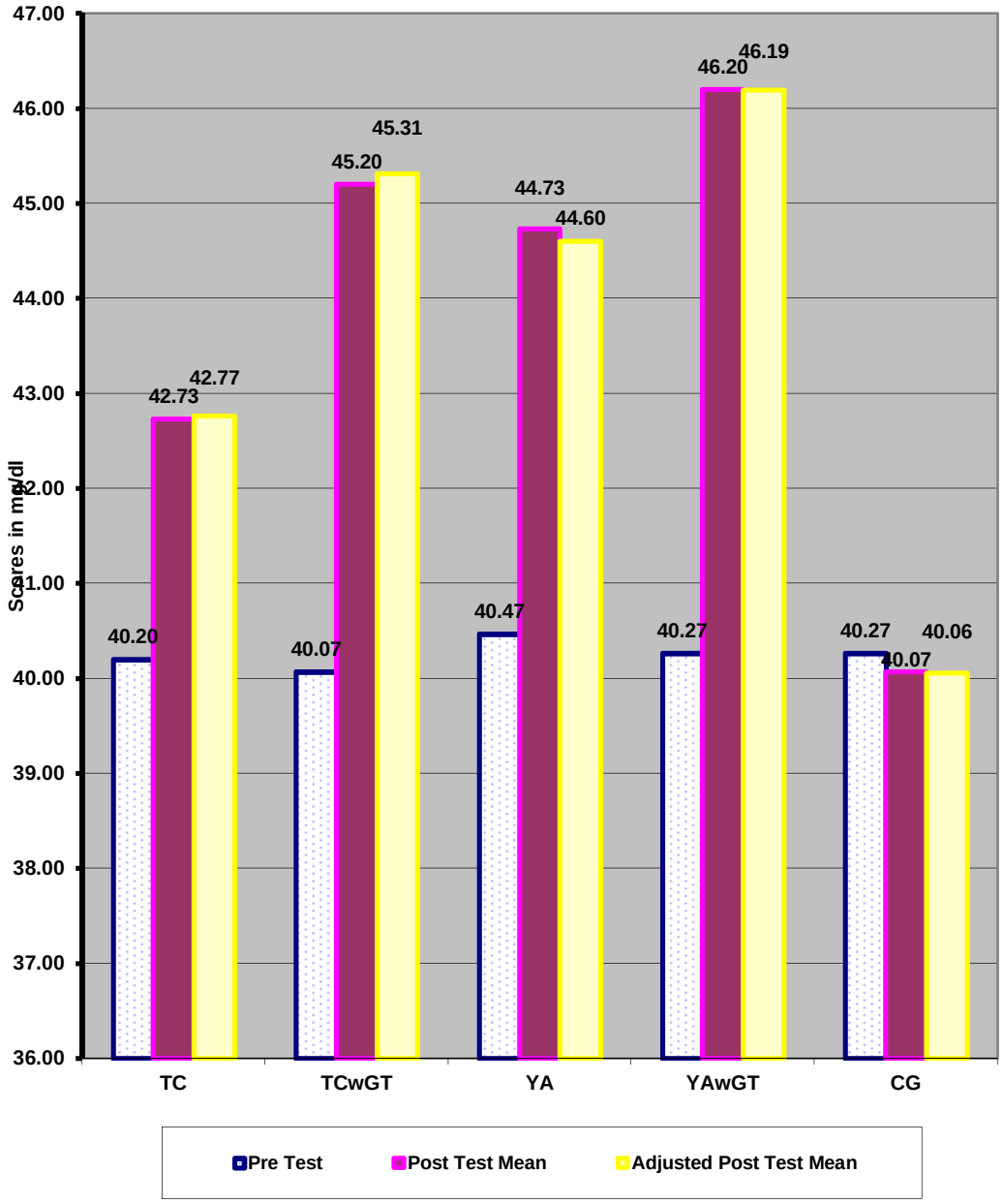
Tai Chi with Green tea Vs Yoga with green tea MD 0.88

Yoga without green tea Vs Yoga with Green tea MD 1.59

The pre test, post test and ordered adjusted means are presented through line graph for better understanding of the results of this study in Figure 8.

FIGURE 8

BAR DIAGRAM SHOWING PRE, POST AND ADJUSTED MEANS ON HIGH DENSITY LIPOPROTEIN



4.3.8.1 DISCUSSION ON FINDINGS ON HIGH DENSITY LIPOPROTEIN

The analysis of covariance due to effects of experimental treatments, namely Tai Chi without green tea supplementation (TC), Tai Chi with green tea supplementation (TCwGT), yoga without green tea supplementation (YA) and yoga with green tea supplementation (YAwGT) on high density lipoprotein is presented in Table XXVI.The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 32.50 was greater than the required table value to be significant at 0.05 level. Thus, the results proved that there were significant improvements on high density lipoprotein due to 12 week's experimental treatment among obese men.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results are presented in Table XXVII. The adjusted means of TC 42.77, TCwGT 45.31, YA 44.60 and YAwGT 46.19 were greater that mean of CG 40.06, on high density lipoprotein among obese men. It was also proved that paired adjusted mean comparisons between TC and control group (CG), TCwGT and CG, YA and CG, YAwGT and CG were significant. And the results proved that comparing to control group all the four experimental treatments significantly improved high density lipoprotein among obese men. The comparisons of differences among experimental groups results presented proved that YA and YAwGT were significantly better than TC. And there was no significant difference between TC and TCwGT, TCwGT and YA, YA and YAwGT, on high density lipoprotein among obese men.

Thus, it was found that TCwGT was significantly better than TC, YAwGT was significantly better than YA in improving high density lipoprotein among obese men. Though adjusted mean of YGwGT was greater than the mean of TCwGT the

difference was not significant at 0.05 level. Thus, it was proved that green tea supplementation with Tai Chi or yoga would give more beneficial effect on high density lipoprotein among obese men.

Anjum Sayyed, et al., (2010) investigated the study of lipid profile and pulmonary functions in subjects participated in sudarshan kriya yoga and noted that it significantly increased the high density lipoproteins level. Baljinder Singh Arora, et al. (2014) investigated the effect of yogic exercises and found that it significantly increased the serum HDL cholesterol in diabetes mellitus. Bhende, et al., (2011) investigated the effect of yogic practices determined that significantly increased the high density lipoproteins on the management of hypertension in working women. Chidambara Raja (2014) investigated the effect of yoga practices and learnt that it significantly increased the high density lipoproteins among female diabetic patients. Dhananjai, et al. (2010) investigated the effect of a 12 week yoga practice and inferred that it significantly increases the high density lipoproteins among obese subjects.

Xin Xin Zheng, et al., (2011) investigated to identify and quantify the effect of green tea and its extract on total cholesterol, LDL cholesterol, and HDL cholesterol studies showed that the administration of green tea beverages or extracts resulted in significant reductions in serum TC and LDL-cholesterol concentrations, but no effect on HDL cholesterol was observed. Pawel, et al., (2012) investigated with the 56 obese, hypertensive subjects were randomized to receive a daily supplement of 1 capsule that contained either 379 mg of GT extract (GTE) or a matching placebo, for 3 months Supplementation also contributed to significant decreases in the total and low-density lipoprotein cholesterol and triglycerides, but an increase in high-density lipoprotein cholesterol. In conclusion, daily supplementation with 379 mg of GTE

favorably influenced blood pressure, insulin resistance, inflammation and oxidative stress, and lipid profile in patients with obesity-related hypertension.

Jen Chen Tsai, et al., (2003) investigated on the effects on blood pressure, lipid profile, and anxiety status on subjects received a 12-week Tai Chi Chuan exercise programme and found the Tai Chi exercise training could decrease blood pressure and resulted in favorable lipid profile changes. Xiao Hong Pan, et al., (2016) investigated the effects of Tai Chi on blood lipid profiles in humans. Tai Chi exercise lowered blood TG level with a trend to decrease blood TC level Yeting, et al. (2017) investigated on the effect of Tai Chi exercise and found Tai Chi exercise could decrease SBP, DBP, TG, LDL-C.

The theoretical foundations proved that isolated Tai Chi, yogic practice and green tea supplementation had contributed to the benefit of physical fitness and biochemical variables. However, there was scarcity of researches comparing effects of Tai Chi and yogic practices with and without green tea supplementation, hence this study was attempted and the results showed that combing green tea with Tai Chi and yogic practices were more beneficial than the isolated Tai Chi and yogic practices among obese men. And the findings of this study were in agreement with these previous research findings and also found combining green tea with yoga would be more beneficial for obese men to improve their HDL.

4.3.9RESULTS ON LOW DENSITY LIPOPROTEIN

The descriptive statistics on obtained data on low density lipoprotein due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of obese men are presented in Table XXVIII.

TABLE XXVIII
DESCRIPTIVE STATISTICS SHOWING MEAN AND STANDARD DEVIATION ON INITIAL, FINAL AND ADJUSTED MEANS ON LOW DENSITY LIPOPROTEIN

	TC Group	TCwGT Group	YA Group	YAwGT Group	Control Group
Pre Test Mean	120.07	121.47	121.27	121.73	121.47
Std Dev	11.14	8.32	8.94	9.37	6.57
Post Test Mean	115.27	113.07	114.13	110.80	121.47
Std Dev	10.96	7.49	8.94	9.00	6.57
Adjusted Post Test Mean	116.36	112.81	114.07	110.29	122.14

As shown in Table XXVIII, the pre test mean on low density lipoprotein of TC group was120.07 with standard deviation $\pm$11.14, pre test mean of TCwGT group was 121.47 with standard deviation $\pm$ 8.32, the pre test mean of YA group was 121.27 with standard deviation $\pm$ 8.94, the pre test mean of YAwGT group was 121.73 with standard deviation $\pm$9.37 and the pre test mean of control group was 121.47 with standard deviation $\pm$ 6.57.

The results presented in Table XXVIII, the post test mean on low density lipoprotein of TC group was 115.27 with standard deviation $\pm$10.96 post test mean of TCwGT group was 113.07 with standard deviation $\pm$7.49, the post test mean of YA group was 114.13 with standard deviation $\pm$7.49, the post test mean of YAwGT

group was 110.80 with standard deviation ±9.00 and control group was 122.40 with standard deviation ±9.52.

Taking into consideration the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on low density lipoprotein on TC group was 116.36, TCwGT group was 112.81, YA group was 114.07 YAwGT group was 110.29 and control group was 122.14.

The statistical analysis comparing the initial and final means of low density lipoprotein due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of low density lipoprotein is presented in Table XXIX.

TABLE XXIX

COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA ON LOW DENSITY LIPOPROTEIN

	SOV	Sum of Squares	DF	Mean Squares	Obtained 'F'
Pre Test Mean	**B**	25.73	4	6.43	0.08
	W	5658.27	70	80.83	
Post Test Mean	**B**	1153.07	4	288.27	3.16*
	W	6379.60	70	91.14	
Adjusted Post Test Mean	**B**	1209.42	4	302.35	18.00*
	W	1158.80	69	16.79	

SOV: Source of Variance; B: Between W: Within

Required $F_{(0.05),(df\ 4,70)} = 2.50$ $F_{(0.05),(df\ 4,69)} = 2.50$

* Significant at 0.05 level of confidence

The obtained F ratio of 0.08 on pre test means on low density lipoprotein of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was no significant difference in the means of the groups at initial stage.

The obtained F ratio of 3.16 on post test means on low density lipoprotein of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was significant difference in the means of the groups after the experimental treatments.

The obtained F value on adjusted means on low density lipoprotein was 18.00. The obtained F value was greater than the required value of 2.58 and hence it was accepted that there was significant differences among the adjusted means on the low density lipoprotein of the subjects.

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

TABLE XXX

MULTIPLE COMPARISONS BETWEEN TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA AND CONTROL GROUPS AND SCHEFFE'S POST HOC ANALYSIS ON LOW DENSITY LIPOPROTEIN

TC group	TCwGT Group	YA Group	YAwGT Group	Control Group	MEAN DIFF	C.I
116.36	112.81				3.54	4.81
116.36		114.07			2.29	4.81
116.36			110.29		6.07*	4.81
116.36				122.14	5.79*	4.81
	112.81	114.07			1.26	4.81
	112.81		110.29		2.52	4.81
	112.81			122.14	9.33*	4.81
		114.07	110.29		3.78	4.81
		114.07		122.14	8.07*	4.81
			110.29	122.14	11.86*	4.81

***** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were greater than required confidence interval of 4.81.

Tai Chi without Green Tea Vs Yoga with green tea group MD 6.07

Tai Chi without Green tea Vs Control Group MD5.79

Tai Chi with Green tea Vs Control Group MD9.33

Yoga without green tea Vs Control Group MD 8.07

Yoga with green tea Vs Control Group MD 11.86

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were less than the required confidence interval of 4.81.

Tai Chi without Green Tea Vs Tai Chi with Green Tea MD: 3.54

Tai Chi without Green Tea Vs Yoga without green tea Group MD 2.29

Tai Chi with Green Tea Vs Yoga without green tea MD 1.26

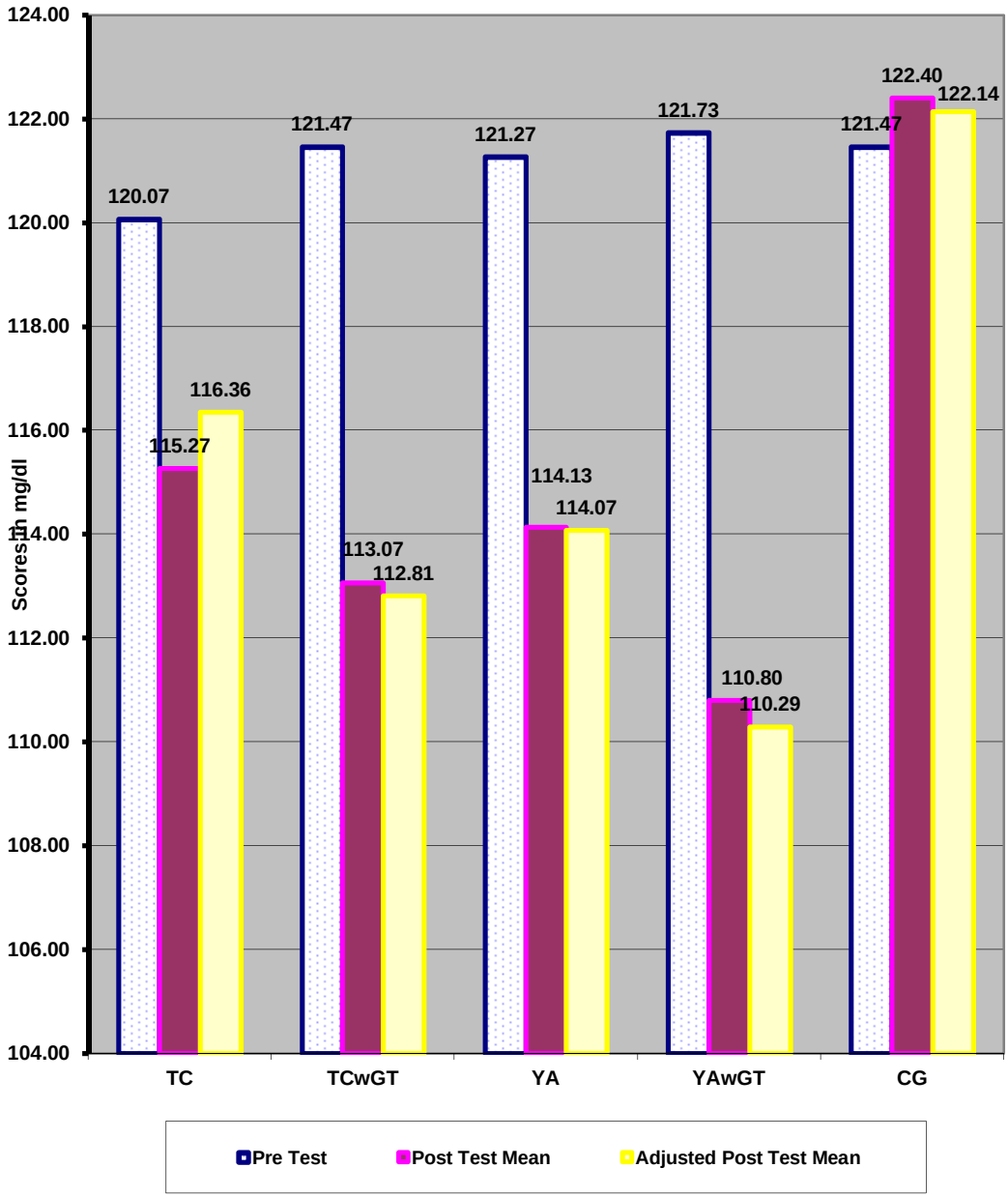
Tai Chi with Green Tea Vs Yoga with green tea MD 2.52

Yoga without green tea Vs Yoga with Green tea MD 3.78

The pre test, post test and ordered adjusted means are presented through line graph for better understanding of the results of this study in Figure 9.

FIGURE 9

BAR DIAGRAM SHOWING PRE, POST AND ADJUSTED MEANS ON LOW DENSITY LIPOPROTEIN



4.3.9.2 DISCUSSION ON FINDINGS ON LOW DENSITY LIPOPROTEIN

The analysis of covariance due to effects of experimental treatments, namely Tai Chi without green tea supplementation (TC), Tai Chi with green tea supplementation (TCwGT), yoga without green tea supplementation (YA) and yoga with green tea supplementation (YAwGT) on low density lipoprotein was presented in Table XXVIII The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 18.00 was greater than the required table F value to be significant at 0.05 level. Thus, the results proved that there were significant improvements on low density lipoprotein due to 12 weeks experimental treatment among obese men.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results presented in Table XXIX. The adjusted means of TC 116.36, TCwGT 112.81, YA 114.07 and YAwGT 110.29 were greater that mean of CG 122.14, on low density lipoprotein among obese men. It was also proved that paired adjusted mean comparisons between TC and control group (CG), TCwGT and CG, YA and CG, YAwGT and CG were significant. And the results proved that comparing to control group all the four experimental treatments significantly reduced low density lipoprotein among obese men. The comparisons of differences among experimental groups results presented proved that YAwGT was significantly better than TC. And there was no significant difference between TC and TCwGT, TCwGT and YA, YA and YAwGT, on low density lipoprotein among obese men.

Thus, it was found that YAwGT was significantly better than TC in reducing low density lipoprotein among obese men. Though adjusted mean of YGwGT was greater than mean of TCwGT the difference was not significant at 0.05 level. Thus, it

was proved that green tea supplementation either with Tai Chi or yoga would give more beneficial effect on low density lipoprotein among obese men.

Ajay Pal, et al., (2011) investigated the effect of yogic practices and found that reduction of SBP, DBP, heart rate, body fat%, total cholesterol, triglycerides and LDL after regular yogic practices was beneficial for cardiac and hypertensive patients. Bhende, et al., (2011) investigated on the effect of yogic practices determined that significantly decreased the low density lipoproteins on the management of hypertension in working women. Dhananjai, et al., (2010) investigated on the effect of a 12 week yoga practice and noted that it significantly decreased the low density lipoproteins among obese subjects. Dide Rast, Hojjati and Shabani (2013) investigated on the effect of yoga training and learnt that it significantly decreased the low density lipoproteins in type II diabetic females. Elangovan and Babu (2011) investigated on the effect of yogic practices and inferred that it significantly decreased the low density lipoproteins among obese college men with age between 19 to 25 years.

Jen Chen Tsai, et al., (2003) investigated on the effects on blood pressure, lipid profile, and anxiety status on subjects received a 12-week Tai Chi Chuan exercise programme and found Tai Chi exercise training could decrease blood pressure and result in favorable lipid profile changes. Xiao Hong Pan, et al., (2016) investigated on the effects of Tai Chi on blood lipid profiles in humans. Tai Chi exercise lowered blood TG level with a trend to decrease blood TC level Yeting, et al., (2017) investigated on the effect of Tai Chi exercise and found that Tai Chi exercise could decrease SBP, DBP, TG, LDL-C.

Pawel, et al. (2012) investigated with 56 obese, hypertensive subjects being randomized to receive a daily supplement of 1 capsule that contained either 379 mg of

GT extract (GTE) or a matching placebo, for 3 months Supplementation also contributed to significant decreases in the total and low-density lipoprotein cholesterol and triglycerides, but an increase in high-density lipoprotein cholesterol. In conclusion, daily supplementation with 379 mg of GTE favorably influenced blood pressure, insulin resistance, inflammation and oxidative stress, and lipid profile in patients with obesity-related hypertension.

Thus, previous researches came out with the findings that Tai Chi, green tea supplementation and yogic practices can contribute to the reduction of LDL and were in agreement with the findings of this study that all the experimental treatments significantly lowered LDL compared with the control group.

4.3.10RESULTS ON TRIGLYCERIDES

The descriptive statistics on obtained data on triglycerides due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of obese men are presented in Table XXXI.

TABLE XXXI
DESCRIPTIVE STATISTICS SHOWING MEAN AND STANDARD DEVIATION ON INITIAL, FINAL AND ADJUSTED MEANS ON TRIGLYCERIDES

	TC Group	TCwGT Group	YA Group	YAwGT Group	Control Group
Pre Test Mean	146.13	148.40	148.93	147.33	147.20
Std Dev	8.94	6.76	9.48	11.21	9.81
Post Test Mean	137.80	135.00	136.20	133.33	147.20
Std Dev	9.76	7.26	9.48	7.72	9.81
Adjusted Post Test Mean	138.79	134.46	135.30	133.51	147.67

As shown in Table XXXI, the pre test mean on triglycerides of TC group was146.13 with standard deviation $\pm$8.94, pre test mean of TCwGT group was 148.40 with standard deviation $\pm$ 6.76, the pre test mean of YA group was 148.93 with standard deviation $\pm$ 9.48, the pre test mean of YAwGT group was 147.33 with standard deviation $\pm$11.21 and the pre test mean of control group was 147.20 with standard deviation $\pm$ 9.81.

As per the results presented in Table XXXI, the post test mean on triglycerides of TC group was 137.80 with standard deviation $\pm$ 9.76, post test mean of TCwGT group was 135.00 with standard deviation $\pm$ 7.26, the post test mean of YA group was 136.20 with standard deviation $\pm$ 7.26, the post test mean of YAwGT group was

133.33 with standard deviation ±7.72 and that of control group was 147.40 with standard deviation ± 9.12.

Taking into consideration of the pre test means and post test means, adjusted post test means were determined and analysis of covariance was done. The adjusted mean on triglycerides on TC group was 138.79, TCwGT group was 134.46, YA group was 135.30 YAwGT group was 133.51 and that of control group was 147.67.

The statistical analysis comparing the initial and final means of triglycerides due to Tai Chi without green tea (TC), Tai Chi with green tea (TCwGT), Yoga without green tea (YA), Yoga with green tea (YAwGT) and control group (CG) of triglycerides is presented in Table XXXII.

TABLE XXXII
COMPUTATION OF ANALYSIS OF COVARIANCE DUE TO TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA ON TRIGLYCERIDES

	SOV	Sum of Squares	DF	Mean Squares	Obtained 'F'
Pre Test Mean	**B**	72.00	4	18.00	0.21
	W	6124.00	70	87.49	
Post Test Mean	**B**	1836.05	4	459.01	6.60*
	W	4865.73	70	69.51	
Adjusted Post Test Mean	**B**	2006.49	4	501.62	16.52*
	W	2095.65	69	30.37	

SOV: Source of Variance; B: Between W: Within
Required $F_{(0.05),\,(df\,4,70)} = 2.50$ $F_{(0.05),\,(df\,4,69)} = 2.50$
* Significant at 0.05 level of confidence

The obtained F ratio of 0.21 on pre test means on triglycerides of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups at initial stage.

The obtained F ratio of 6.60 on post test means on triglycerides of the groups was not significant at 0.05 level as the obtained F value was less than the required table F value of 2.58 to be significant at 0.05 level. This shows that there was no significant difference in means of the groups after the experimental treatments.

The obtained F value on adjusted means on triglycerides was 16.52. The obtained F value was greater than the required value of 2.58 and hence it was accepted that there was significant differences among the adjusted means on the triglycerides of the subjects.

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

TABLE XXXIII

MULTIPLE COMPARISONS BETWEEN TAI CHI WITHOUT GREEN TEA, TAI CHI WITH GREEN TEA, YOGA WITHOUT TEA, YOGA WITH GREEN TEA AND CONTROL GROUPS AND SCHEFFE'S POST HOC ANALYSIS ON TRIGLYCERIDES

TC group	TCwGT Group	YA Group	YAwGT Group	Control Group	MEAN DIFF	C.I
138.79	134.46				4.32	6.46
138.79		135.30			3.48	6.46
138.79			133.51		5.27	6.46
138.79				147.67	8.88*	6.46
	134.46	135.30			0.84	6.46
	134.46		133.51		0.95	6.46
	134.46			147.67	13.21*	6.46
		135.30	133.51		1.79	6.46
		135.30		147.67	12.37*	6.46
			133.51	147.67	14.16*	6.46

***** Significant at 0.05 level.

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were greater than the required confidence interval of 6.46.

Tai Chi without Green tea Vs Control Group MD8.88

Tai Chi with Green tea Vs Control Group MD13.21

Yoga without green tea Vs Control Group MD 12.37

Yoga with green tea Vs Control Group MD 14.16

The post hoc analysis of obtained ordered adjusted means proved that the following paired mean differences were less than the required confidence interval of 6.46.

Tai Chi without Green tea Vs Tai Chi with Green tea MD: 4.32

Tai Chi without Green tea Vs Yoga without green tea Group MD 3.48

Tai Chi without Green tea Vs Yoga with green tea group MD 5.27

Tai Chi with Green tea Vs Yoga without green tea MD 0.84

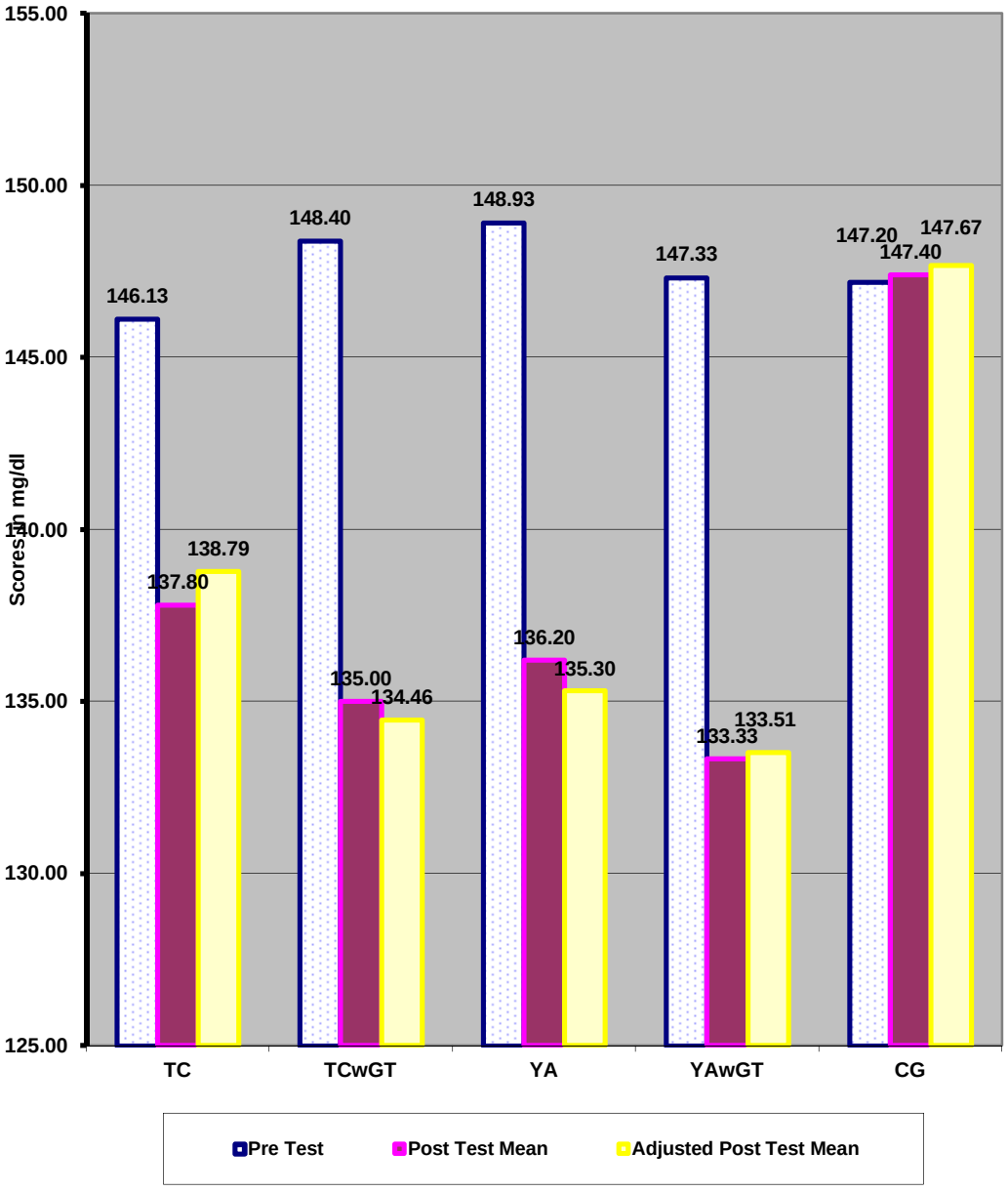
Tai Chi with Green tea Vs Yoga with green tea MD 0.95

Yoga without green tea Vs Yoga with Green tea MD 1.79

The pre test, post test and ordered adjusted means are presented through line graph for better understanding of the results of this study in Figure 10.

FIGURE 10

BAR DIAGRAM SHOWING PRE, POST AND ADJUSTED MEANS ON TRIGLYCERIDES



4.3.10.2 DISCUSSION ON FINDINGS ON TRIGLYCERIDES

The analysis of covariance due to effects of experimental treatments, namely Tai Chi without green tea supplementation (TC), Tai Chi with green tea supplementation (TCwGT), yoga without green tea supplementation (YA) and yoga with green tea supplementation (YAwGT) on triglycerides is presented in Table XXXII. The analysis of covariance proved that there was significant difference between the experimental group and control group as the obtained F value 16.52 was greater than the required table value to be significant at 0.05 level. Thus, the results proved that there were significant improvements on triglycerides due to 12 weeks experimental treatment among obese men.

Since significant F value was obtained, the results were further subjected to post hoc analysis and the results presented in Table XXXIII. The adjusted means of TC 138.79, TCwGT 134.46, YA 135.30 and YAwGT 133.51 were greater that mean of CG 147.67, on triglycerides among obese men. It was also proved that paired adjusted mean comparisons between TC and control group (CG), TCwGT and CG, YA and CG, YAwGT and CG were significant. And the results proved that comparing to control group all the four experimental treatments significantly improved triglycerides among obese men. Even though TCwGT and YAwGT had greater influence than TC and YA the changes were not significant among obese men.

Ajay Pal, et al. (2011) investigated on the effect of yogic practicesand concluded that reduction of SBP, DBP, heart rate, body fat%, total cholesterol, triglycerides and LDL after regular yogic practices would be beneficial for cardiac and hypertensive patients. Bhende et al. (2011) investigated on the effect of yogic practices and found that it significantly decreases the triglycerides on the management of hypertension in working women. Chidambara Raja (2014) investigated the effect of

yoga practices and found that it significantly decreased the total cholesterol, triglycerides and uric acid among women diabetic patients. Gordon, et al., (2008) investigated on the effect of exercise therapy and showed that it significantly decreased the triglycerides among patients with type 2 diabetes. Leela, et al., (2013) investigated on the effect of pranayama and yoga and noted that it significantly decreased the triglycerides level in healthy subjects.

Jen Chen Tsai, et al., (2003) investigated the effects on blood pressure, lipid profile, and anxiety status on subjects received a 12-week Tai Chi Chuan exercise programme and found Tai Chi exercise training could decrease blood pressure and result in favorable lipid profile changes. Xiao Hong Pan, et al., (2016) investigated the effects of Tai Chi on blood lipid profiles in humans. Tai Chi exercise lowered blood TG level with a trend to decrease blood TC level Yeting, et al., (2017) investigated on the effect of Tai Chi exercise and found that Tai Chi exercise can decrease SBP, DBP, TG, LDL-C.

Pawel, et al., (2012) investigated with could 56 obese, hypertensive subjects being randomized to receive a daily supplement of 1 capsule that contained either 379 mg of GT extract (GTE) or a matching placebo, for 3 months. Supplementation also contributed to significant decreases in the total and low-density lipoprotein cholesterol and triglycerides, but an increase in high-density lipoprotein cholesterol. In conclusion, daily supplementation with 379 mg of GTE favorably influenced blood pressure, insulin resistance, inflammation and oxidative stress, and lipid profile in patients with obesity-related hypertension.

The findings of this study showed that Tai Chi and yogic practices with and without green tea supplementation would significantly reduce triglycerides and were in agreement with these previous researches.

4.4 DISCUSSION ON HYPOTHESES

The formulated hypothesis No. 1 stated that there would be a significant difference due to experimental treatments, Tai Chi and yogic practices with and without green tea supplementation on selected health related physical fitness variables muscular strength, muscular endurance, flexibility, cardio respiratory endurance and body mass index compared to control group among obese men.

The ANCOVA results presented in Tables V, VIII, XI, XIV, and XVII on health related physical fitness variables muscular strength, muscular endurance, flexibility, cardio respiratory endurance and body mass index respectively proved that the obtained F values 18.22, 24.16, 17.98, 9.04 and 12.95 were greater than the required table F value 2.5 to be significant at 0.05 level, due to Tai Chi and yogic practices with and without green tea supplementation. Since significant F values were obtained, the results were further subjected to statistical treatment using Scheffe's confidence interval test. The results presented in Tables VI, IX, XII, XV, and XVIII respectively on selected health related physical fitness variables. The adjusted paired mean comparisons proved that Tai Chi and yogic practices with and without green tea supplementation significantly improved health related physical fitness variables, muscular strength, muscular endurance and flexibility and the formulated hypothesis No. 1 that experimental groups would significantly improve selected health fitness variables compared to control group was accepted at 0.05 level.

The formulated hypothesis No. 2 stated that there would be significant difference on selected health related physical fitness variables muscular strength, muscular endurance, flexibility, cardio respiratory endurance and body mass index among experimental groups Tai Chi without green tea supplementation (TC), Tai Chi

with green tea supplementation (TCwGT), yogic practices without green tea supplementation (YA) and yogic practices with green tea supplementation (YAwGT).

The post hoc analysis results on selected health related physical fitness variables, presented in Tables VI, IX, XII, XV, and XVIII respectively on selected health related physical fitness variables proved that there existed significant differences among experimental groups and the formulated hypothesis No. 2 that there would be significant differences among experimental groups on selected health related variables of obese men was accepted at 0.05 level.

The formulated hypothesis No. 3 stated that there would be a significant difference due to experimental treatments, Tai Chi and yogic practices with and without green tea supplementation on selected bio chemical variables fasting blood glucose, total cholesterol, high density lipoprotein, low density lipoprotein and triglycerides compared to control group among obese men.

The ANCOVA results presented in Tables XX, XXIII, XXVI, XXIX, and XXXII on biochemical variables fasting blood glucose, total cholesterol, high density lipoprotein, low density lipoprotein and triglycerides respectively proved that the obtained F values 21.93, 34.59, 32.50, 18.00, and 16. 52 were greater than the required table F value 2.5 to be significant at 0.05 level, due to Tai Chi and yogic practices with and without green tea supplementation. Since significant F values were obtained, the results were further subjected to statistical treatment using Scheffe's confidence interval test. And the results presented in Tables XXI, XXIV, XXVII, XXX and XXXIII respectively on selected biochemical variables. The adjusted paired mean comparisons proved that Tai Chi and yogic practices with and without green tea supplementation significantly altered bio chemical variables, fasting blood glucose, total cholesterol, high density lipoprotein,

low density lipoprotein and triglycerides and the formulated hypothesis No. 3 that experimental groups would significantly alter selected biochemical variables compared to control group was accepted at 0.05 level.

The formulated hypothesis No. 4 stated that there would be significant difference on selected biochemical variables, namely fasting blood glucose, total cholesterol, high density lipoprotein, low density lipoprotein and triglycerides among experimental groups Tai Chi without green tea supplementation (TC), Tai Chi with green tea supplementation (TCwGT), yogic practices without green tea supplementation (YA) and yogic practices with green tea supplementation (YAwGT).

The post hoc analysis results presented in Tables XXI, XXIV, XXVII, XXX and XXXIII on selected biochemical variables proved that there existed differences between treatment groups in altering biochemical variables. Thus, the formulated hypothesis No. 4 that there would be significant differences among experimental groups on selected bio chemical variables of obese men was accepted at 0.05 level.