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EFFECT OF CIRCADIAN OSCILLATION DURING FOOD DEPRIVATION ON TOTAL CHOLESTEROL IN OBESE MEN

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Abstract:

The purpose of the study was to find out the effect of circadian oscillation during food deprivation on total cholesterol among obese men. To achieve the purpose of the present study, sixty obese men from Islamiah College, Vaniyambadi, Tamilnadu, India were selected as subjects at random and their ages ranged from 18 to 25 years. The subjects were divided into four equal groups of fifteen subjects each. Group I acted as Experimental Group I (Food Deprivation Training), Group II acted as Experimental Group II (Physical training), Group III acted as Experimental Group III (Food Deprivation & Physical training) and Group IV acted as Control Group. The requirement of the experiment procedures, testing as well as training schedule was explained to the subjects so as to get full co-operation of the effort required on their part and prior to the administration of the study. Total cholesterol was assessed by lab test. Experimental Group I was exposed to food deprivation training, Experimental Group II was exposed to physical training, Experimental Group III was exposed to food deprivation & physical training and Control Group was not exposed to any experimental training other than their regular daily activities. The duration of experimental period was 120 days. After the experimental treatment, all the sixty subjects were tested on total cholesterol. This final test scores formed as post test scores of the subjects. The pre test and post test scores were subjected to statistical analysis using Analysis of Covariance (ANCOVA) to find out the significance among the mean differences, whenever the 'F' ratio for adjusted test was found to be significant, Scheffe's post hoc test was used. In all cases 0.05 level of significance was fixed to test hypotheses. The findings of the study showed that the combined food deprivation and physical training group showed changes in total cholesterol than the other experimental and control groups.

Key Words: Circadian Rhythm, Obese, Men & Total Cholesterol

Introduction:

Within the circadian (24-hour) cycle, a person usually sleeps approximately 8 hours and is awake 16 hours. During the wakeful hours, mental and physical functions are most active and tissue cell growth increases. During sleep, voluntary muscle activities nearly disappear and there is a decrease in metabolic rate, respiration, heart rate, body temperature, and blood pressure. The activity of the digestive system increases during the resting period, but that of the urinary system decreases. Hormones secreted by the body, such as the stimulant epinephrine (adrenaline), are released in maximal amounts about two hours before awakening so that the body is prepared for activity. The circadian cycle is controlled by a region of the brain known as the hypothalamus, which is the master centre for integrating rhythmic information and establishing sleep patterns. A part of the hypothalamus called the suprachiasmatic nucleus (SCN) receives signals about light and dark from the retina of the eye. A clock entrained to the natural environment has a 24 hour period, while to a free running (non 24 hour) circadian clock (in constant dark or dim– light conditions) has a slightly different period, with marked variability among species and individuals. In humans, for example, the period is slightly longer than 24 hour, while in most rodents it is slightly less. The components of a circadian system include the clock itself, which generates the biological rhythms; input pathways that transmit environmental cues to the clock; and output pathways that transmit the clock‟s rhythms to the rest of the organism, influencing a large number of endocrinology, biochemical, and electrophysiological processes (Frederick & Kay, 2007).

Excess body weight and fatness pose a threat to both the quality and quantity of one's life. Obese individuals have shorter life expectancy and greater risks of CHD, hypercholesterolemia, hypertension, diabetes mellitus, certain cancers and osteoarthritis. For a comprehensive report and roundtable discussion of the role of physical activity in the prevention and treatment of obesity and its comorbidities,

Methodology:

The purpose of the study was to find out the effect of circadian oscillation during food deprivation on total cholesterol among obese men. To achieve the purpose of the present study, sixty obese men from Islamiah College, Vaniyambadi, Tamilnadu, India were selected as subjects at random and their ages ranged from 18 to 25 years. The subjects were divided into four equal groups of fifteen subjects each. Group I acted as Experimental Group I (Food Deprivation Training), Group II acted as Experimental Group II (Physical

training), Group III acted as Experimental Group III (Food Deprivation & Physical training) and Group IV acted as Control Group. The requirement of the experiment procedures, testing as well as training schedule was explained to the subjects so as to get full co-operation of the effort required on their part and prior to the administration of the study. Total cholesterol was assessed by lab test. Experimental Group I was exposed to food deprivation training, Experimental Group II was exposed to physical training, Experimental Group III was exposed to food deprivation & physical training and Control Group was not exposed to any experimental training other than their regular daily activities. The duration of experimental period was 120 days. After the experimental treatment, all the sixty subjects were tested on total cholesterol. This final test scores formed as post test scores of the subjects. The pre test and post test scores were subjected to statistical analysis using Analysis of Covariance (ANCOVA) to find out the significance among the mean differences, whenever the 'F' ratio for adjusted test was found to be significant, Scheffe's post hoc test was used. In all cases 0.05 level of significance was fixed to test hypotheses.

Results:

Table 1: Computation of Analysis of Covariance of Food Deprivation, Physical Training, Combined Food Deprivation and Physical Training and Control Groups on Total Cholesterol at 6.00 am

	FDG	PTG	CFDPTG	CG	Source of Variance	Sum of Squares	df	Means Squares	F-ratio
Pre-Test Means	225.60	224.93	226.33	226.20	**BG**	18.46	3	6.15	0.40
					WG	852.26	56	15.21	
Post-Test Means	213.26	213.20	205.93	224.06	**BG**	2512.98	3	837.66	31.84*
					WG	1473.20	56	26.30	
Adjusted Post-Test Means	213.24	213.06	206.02	224.13	**BG**	2516.07	3	838.69	31.78*
					WG	1451.47	55	26.39	

Results of Total Cholesterol at 6.00 am:

Table – I reveals that the indicated that the obtained 'F'-ratio for the pre-test means among the groups on total cholesterol were 225.60 for experimental group – I, 224.93 for experimental group - II, 226.33 for experimental group - III and 226.20 for control group. The obtained 'F'-ratio 0.40 was lesser than the table 'F'-ratio 2.76. Hence the pre-test mean 'F'-ratio was insignificant at 0.05 level of confidence for the degree of freedom 3 and 56. The post-test means were 213.26 for experimental group – I, 213.20 for experimental group – II, 205.93 for experimental group - III and 224.06 for control group. The obtained 'F'-ratio 31.84 was higher than the table 'F'-ratio 2.76. Hence the post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 56. The adjusted post-test means were 213.24 for experimental group – I, 213.06 for experimental group – II, 206.02 for experimental group - III and 224.13 for control group. The obtained 'F'-ratio 31.78 was higher than the table 'F'-ratio 2.77. Hence the adjusted post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 55.

Table 2: The Scheffe's Test for the Differences Between the Adjusted Post Test Means on Total Cholesterol at 6.00 am

Adjusted Post-Test Means				Mean Difference	Confidence Interval
FDG	PTG	CFDPTG	CG		
213.24	213.06	---	---	0.18	5.40
213.24	---	206.02	---	7.22*	
213.24	---	---	224.13	10.90*	
---	213.06	206.02	---	7.04*	
---	213.06	---	224.13	11.07*	
---	---	206.02	224.13	18.11*	

* Significant at 0.05 level of confidence

Table II shows the post hoc analysis obtained on adjusted post test means. The mean difference required for the confidential interval to be significant was 5.40. It was observed that the combined food deprivation and physical activity group significantly decreased total cholesterol better than the food deprivation, physical activity and control group. The physical activity group significantly decreased total cholesterol better than the control group. The food deprivation group significantly decreased total cholesterol better than the control group. The pre, post and adjusted means on total cholesterol were presented through bar diagram for better understanding of the results of this study in Figure-II.

Figure 1: Pre Post and Adjusted Post Test Differences of the Experimental and Control Groups on Total Cholesterol at 6.00 am

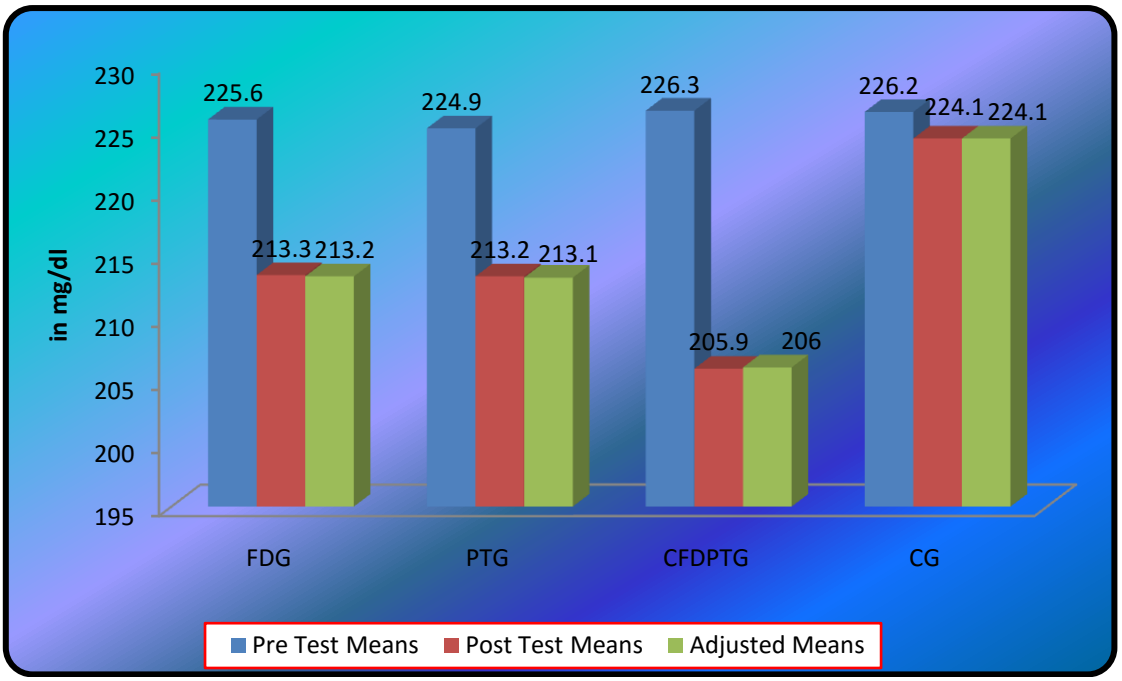


Table 3: Computation of Analysis of Covariance of Food Deprivation, Physical Training, Combined Food Deprivation and Physical Training and Control Groups on Total Cholesterol at 8.00 am

	FDG	PTG	CFDPTG	CG	Source of Variance	Sum of Squares	df	Means Squares	F-ratio
Pre-Test Means	225.53	226.66	224.20	225.86	**BG**	47.53	3	15.84	1.05
					WG	839.20	56	14.98	
Post-Test Means	215.93	215.00	209.06	223.40	**BG**	1556.18	3	518.72	22.66*
					WG	1281.46	56	22.88	
Adjusted Post-Test Means	215.93	215.07	208.97	223.42	**BG**	1547.54	3	515.85	22.20*
					WG	1277.87	55	23.23	

Results of Total Cholesterol 8.00 am:

Table – III reveals that the indicated that the obtained 'F'-ratio for the pre-test means among the groups on total cholesterol were 225.53 for experimental group – I, 226.66 for experimental group - II, 224.20 for experimental group - III and 225.86 for control group. The obtained 'F'-ratio 1.05 was lesser than the table 'F'-ratio 2.76. Hence the pre-test mean 'F'-ratio was insignificant at 0.05 level of confidence for the degree of freedom 3 and 56. The post-test means were 215.93 for experimental group – I, 215.00 for experimental group – II, 209.06 for experimental group - III and 223.40 for control group. The obtained 'F'-ratio 22.66 was greater than the table 'F'-ratio 2.76. Hence the post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 56. The adjusted post-test means were 215.93 for experimental group – I, 215.07 for experimental group – II, 208.97 for experimental group - III and 223.42 for control group. The obtained 'F'-ratio 22.20 was greater than the table 'F'-ratio 2.77. Hence the adjusted post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 55.

Table 4: The Scheffe's Test for the Differences Between the Adjusted Post Test Means on Total Cholesterol at 8.00 am

Adjusted Post-Test Means				Mean Difference	Confidence Interval
FDG	**PTG**	**CFDPTG**	**CG**		
215.93	215.07	---	---	0.86	5.07
215.93	---	208.97	---	6.96*	
215.93	---	---	223.42	7.49*	
---	215.07	208.97	---	6.10*	
---	215.07	---	223.42	8.35*	
---	---	208.97	223.42	14.45*	

* Significant at 0.05 level of confidence

Table IV shows the post hoc analysis obtained on adjusted post test means. The mean difference required for the confidential interval to be significant was 5.07. It was observed that the combined food deprivation and physical activity group significantly decreased total cholesterol better than the food deprivation, physical activity and control group. The physical activity group significantly decreased total cholesterol better

than the control group. The food deprivation group significantly decreased total cholesterol better than the control group.The pre, post and adjusted means on total cholesterol were presented through bar diagram for better understanding of the results of this study in Figure-II.

Figure 2: Pre Post and Adjusted Post Test Differences of the Experimental and Control Groups on Total Cholesterol at 8.00 am

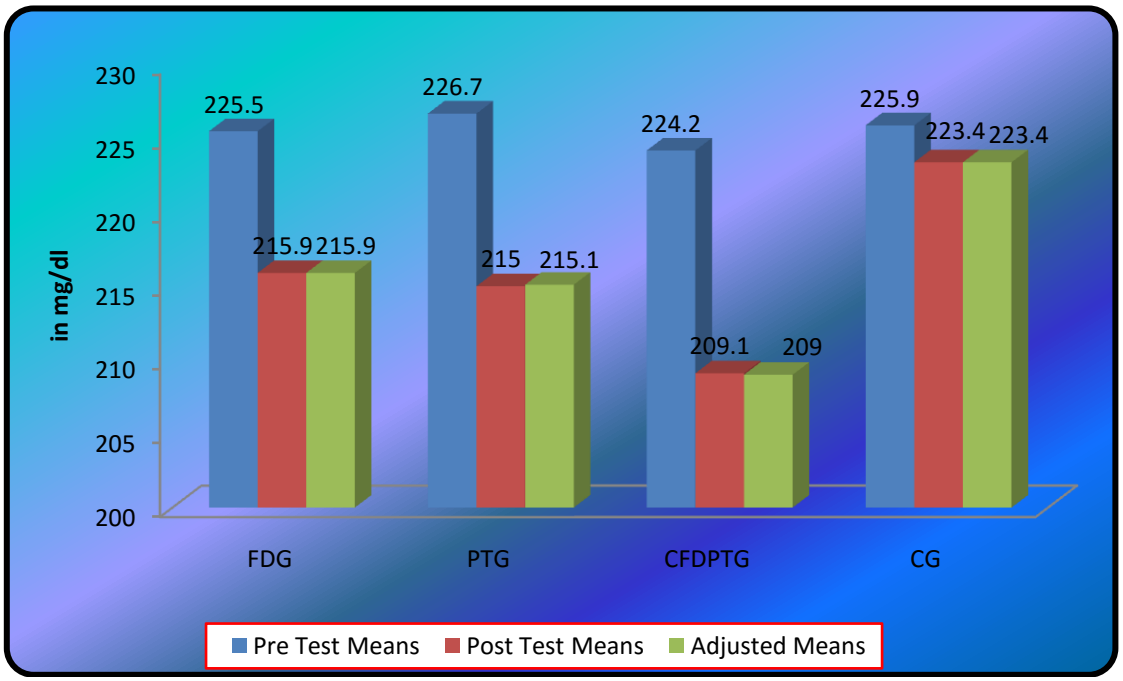


Table 5: Computation of Analysis of Covariance of Food Deprivation, Physical Training, Combined Food Deprivation and Physical Training and Control Groups on Total Cholesterol at 4.00 pm

	FDG	PTG	CFDPTG	CG	Source of Variance	Sum of Squares	df	Means Squares	F-ratio
Pre-Test Means	226.00	225.40	226.20	225.06	**BG**	12.40	3	4.13	0.29
					WG	780.93	56	13.94	
Post-Test Means	216.06	216.40	209.46	224.93	**BG**	1808.98	3	602.99	24.03*
					WG	1405.20	56	25.09	
Adjusted Post-Test Means	216.16	216.32	209.61	224.76	**BG**	1712.48	3	570.83	23.39*
					WG	1342.24	55	24.40	

Results of Total Cholesterol 4.00 pm:

Table –V reveals that the indicated that the obtained 'F'-ratio for the pre-test means among the groups on total cholesterol were 226.00 for experimental group – I, 225.40 for experimental group - II, 226.20 for experimental group - III and 225.06 for control group. The obtained 'F'-ratio 0.29 was lesser than the table 'F'-ratio 2.76. Hence the pre-test mean 'F'-ratio was insignificant at 0.05 level of confidence for the degree of freedom 3 and 56. The post-test means were 216.06 for experimental group – I, 216.40 for experimental group – II, 209.46 for experimental group - III and 224.93 for control group. The obtained 'F'-ratio 24.03 was higher than the table 'F'-ratio 2.76. Hence the post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 56. The adjusted post-test means were 216.16 for experimental group – I, 216.32 for experimental group – II, 209.61 for experimental group - III and 224.76 for control group. The obtained 'F'-ratio 23.39 was higher than the table 'F'-ratio 2.77. Hence the adjusted post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 55.

Table 6: The Scheffe's Test for the Differences between the Adjusted Post Test Means on Total Cholesterol st 4.00 pm

Adjusted Post-Test Means				Mean Difference	Confidence Interval
FDG	PTG	CFDPTG	CG		
216.16	216.32	---	---	0.16	5.19
216.16	---	209.61	---	6.55*	
216.16	---	---	224.76	8.60*	
---	216.32	209.61	---	6.71*	
---	216.32	---	224.76	8.44*	
---	---	209.61	224.76	15.15*	

* Significant at 0.05 level of confidence

Table VIshows the post hoc analysis obtained on adjusted post test means. The mean difference required for the confidential interval to be significant was 5.19. It was observed that the combined food deprivation and physical activity group significantly decreased total cholesterol better than the food deprivation group, physical activity group and control group. The physical activity group significantly decreased total cholesterol better than the control group. The food deprivation group significantly decreased total cholesterol better than the control group. The pre, post and adjusted means on total cholesterol were presented through bar diagram for better understanding of the results of this study in Figure-III.

Figure 3: Pre Post and Adjusted Post Test Differences of the Experimental and Control Groups on Total Cholesterol at 4.00 Pm

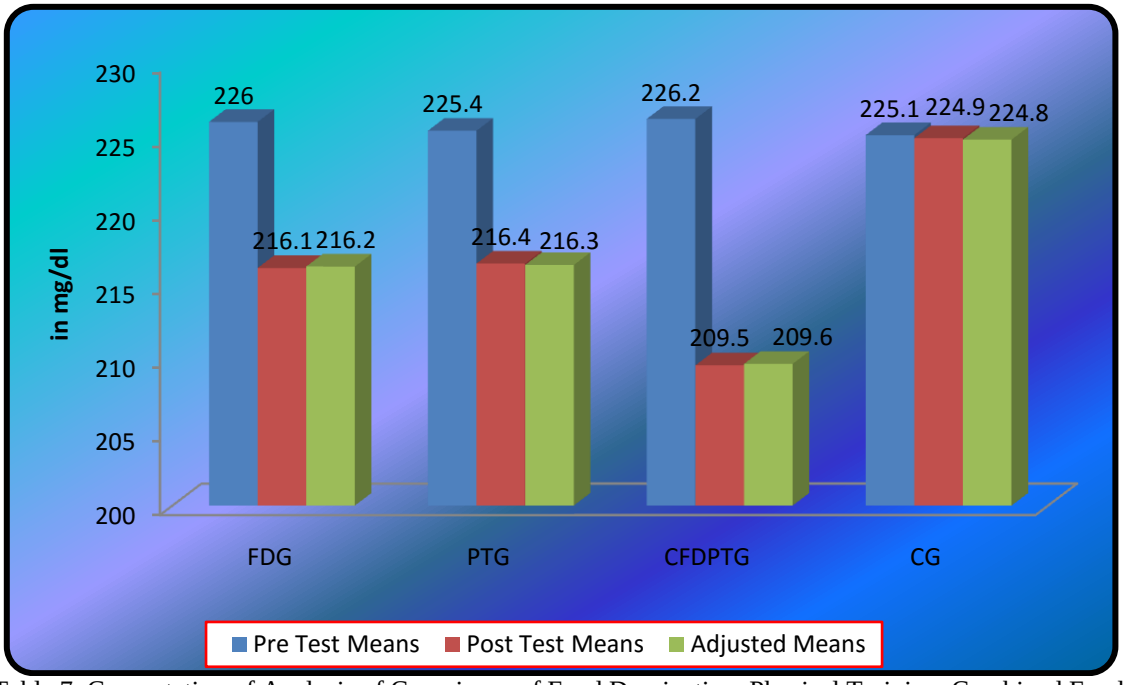


Table 7: Computation of Analysis of Covariance of Food Deprivation, Physical Training, Combined Food Deprivation and Physical Training and Control Groups on Total Cholesterol at 6.00 pm

	FDG	PTG	CFDPTG	CG	Source of Variance	Sum of Squares	df	Means Squares	F-ratio
Pre-Test Means	225.80	225.60	224.93	224.26	**BG**	21.78	3	7.26	0.50
					WG	805.86	56	14.39	
Post-Test Means	217.00	216.80	209.73	223.60	**BG**	1443.25	3	481.08	16.16*
					WG	1666.93	56	29.76	
Adjusted Post-Test Means	217.07	216.84	209.71	223.50	**BG**	1424.68	3	474.89	15.75*
					WG	1657.57	55	30.13	

Results of Total Cholesterol 6.00 pm:

Table –VII reveals that the indicated that the obtained 'F'-ratio for the pre-test means among the groups on total cholesterol were 225.80 for experimental group – I, 225.60 for experimental group - II, 224.93 for experimental group - III and 224.26 for control group. The obtained 'F'-ratio 0.50 was lesser than the table 'F'-ratio 2.76. Hence the pre-test mean 'F'-ratio was insignificant at 0.05 level of confidence for the degree of freedom 3 and 56. The post-test means were 217.00 for experimental group – I, 216.80 for experimental group – II, 209.73 for experimental group - III and 223.60 for control group. The obtained 'F'-ratio 16.16 was higher than the table 'F'-ratio 2.76. Hence the post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 56. The adjusted post-test means were 217.07 for experimental group – I, 216.84 for experimental group – II, 209.71 for experimental group - III and 223.50 for control group. The obtained 'F'-ratio 15.75 was higher than the table 'F'-ratio 2.77. Hence the adjusted post-test mean 'F'-ratio was significant at 0.05 level of confidence for the degree of freedom 3 and 55.

Table 8: The Scheffe's Test for the Differences Between the Adjusted Post Test Means on Total Cholesterol at 6.00 pm

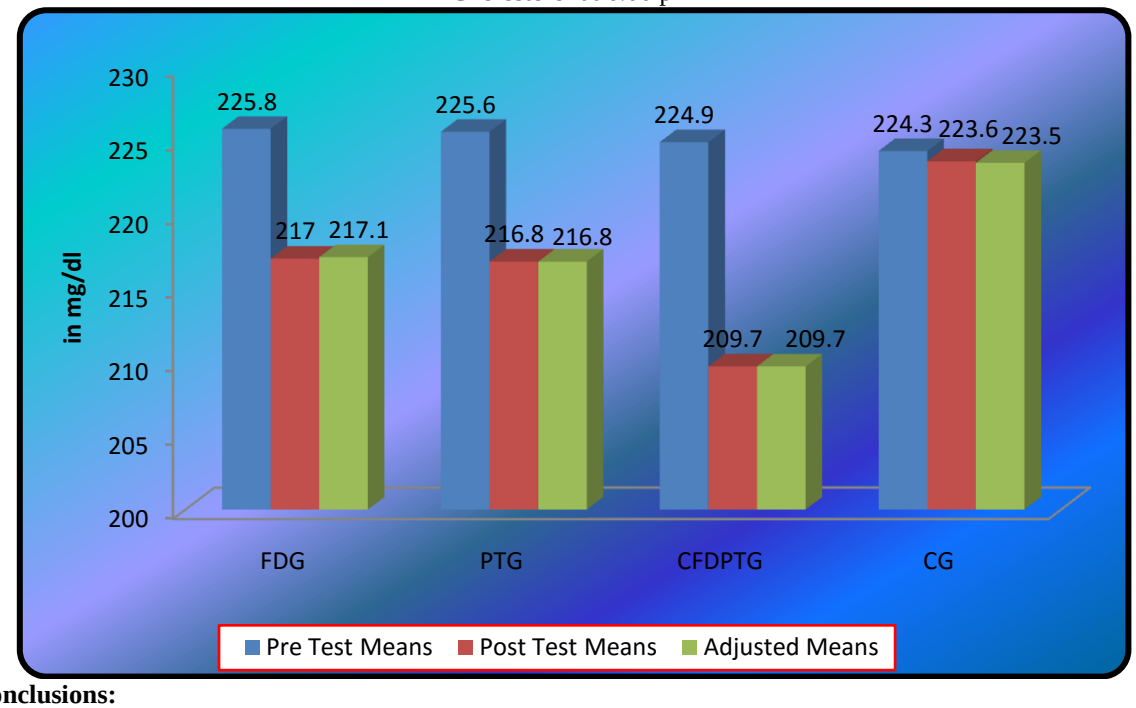
Adjusted Post-Test Means				Mean Difference	Confidence Interval
FDG	PTG	CFDPTG	CG		
217.07	216.84	---	---	0.23	

217.07	---	209.71	---	7.36*	5.77
217.07	---	---	223.50	6.43*	
---	216.84	209.71	---	7.13*	
---	216.84	---	223.50	6.66*	
---	---	209.71	223.50	13.79*	

* Significant at 0.05 level of confidence

Table VIII shows the post hoc analysis obtained on adjusted post test means. The mean difference required for the confidential interval to be significant was 5.77. It was observed that the combined food deprivation and physical activity group significantly decreased total cholesterol better than the food deprivation group, physical activity group and control group. The physical activity group significantly decreased total cholesterol better than the control group. The food deprivation group significantly decreased total cholesterol better than the control group. The pre, post and adjusted means on total cholesterol were presented through bar diagram for better understanding of the results of this study in Figure-IV.

Figure 4: Pre Post and Adjusted Post Test Differences of the Experimental and Control Groups on Total Cholesterol at 6.00 pm



Conclusions:

From the analysis of the data, the following conclusions were drawn:

- ✓ The findings of the study showed that there were significant changes in total cholesterol due to influence of food deprivation at 6.00 am, 8.00 am, 4.00 pm and 8.00 pm respectively.
- ✓ The findings of the study showed that there were significant changes in total cholesterol due to influence of physical training at 6.00 am, 8.00 am, 4.00 pm and 8.00 pm respectively.
- ✓ The findings of the study showed that there were significant changes in total cholesterol due to influence of combined food deprivation and physical training at 6.00 am, 8.00 am, 4.00 pm and 8.00 pm respectively.
- ✓ The findings of the study showed that the combined food deprivation and physical training group showed changes in total cholesterol than the other experimental and control groups.

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