

A study of the effects of anuloma viloma pranayama on hematological parameters

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Abstract. The purpose of this study was to investigate the effects of anuloma viloma pranayama on hematological parameters. Fifty, university level girls of Department of Physical Education (T), Guru Nanak Dev University, Amritsar (age = 20.68 ± 2.226 years, height = 5.57 ± 2.101 feet's, body mass = 68.27 ± 4.350 kg) volunteered to participate in the study. The subjects from Group A (experimental) were subjected to a 4 weeks anuloma viloma pranayama (alternate nostril). Student t test for paired samples was utilized to compare the means of the pre-test and the post-test. No significant differences were found in Hemoglobin (Hb), Total Cholesterol (TC), Low Density Lipoprotein Cholesterol (LDL-Cholesterol), High Density Lipoprotein Cholesterol (HDL-Cholesterol) and Triglycerides (TG) among University Level Girls.

Key words: *anuloma viloma pranayama, hemoglobin, serum cholesterol, serum triglycerides.*

Introduction

The Indian sage patanjali prescribed adherence to eight limbs of yoga, aimed at quieting one's mind to achieve the union of mind, body and spirit- the ultimate aim of traditional yoga. These limbs include 'Yama' and 'Niyama' (a code of conduct for an ethical lifestyle), 'Asana' (physical postures), 'Pranayama' (breath control), 'Pratyahara' (with drawl of the senses from external objects to increase self-awareness), 'Dharana' (concentration), 'Dhyana' (meditation) and 'Samadhi' (oneness with the object of meditation) (1, 2).

Speaking specifically, Yoga therapy is the "process of empowering individuals to progress toward improved health and well-being through the application of the philosophy and practice of Yoga" (3).

Accordingly Pranayama is one of the eight limbs of Yoga, as defined by the yoga sutras of patanjali. Yoga breathing exercises- also known as pranayama- is an ancient practice concerned with breath control being an important part of an emerging yoga practice. The beneficial effects of different pranayama are well reported and has sound scientific basis (4, 5).

There are reported evidences of pranayama that increase chest wall expansion and lung volumes (6, 7). Many researchers and Yogis have reported the benefits of practising pranayama on diabetes mellitus (8),

heart rate and nervous system (9). Research through Yoga meditation has also shown remarkable improvement in patience, physical relaxation, mental stress relief (10) and physical relaxation (11) of the chosen subjects. There are various techniques of pranayama but we have applied the technique of Anuloma Viloma Pranayama on the subjects.

Material and Method

Subjects. Fifty, university level girls of Department of Physical Education (T), Guru Nanak Dev University, Amritsar (age = 20.68 ± 2.226 years, height = 5.57 ± 2.101 feet's, body mass = 68.27 ± 4.350 kg) volunteered to participate in the study. The subjects were purposively assigned into two groups: Group-A: Experimental ($n_1=25$) and Group-B: Control ($n_2=25$). Distribution and demographics of subjects are presented in table I.

Table 1. Distribution and demographics of subjects

Variables	Sample Size (N=50)		
	Total (N=50)	Experimental group (n ₁ =25)	Control group (n ₂ =25)
Age (years)	20.68±2.226	21.12±1.9	20.24±2.471
Body Height (feet)	5.57±2.101	5.584±1.929	5.556±2.292
Body Mass (kg)	68.27±4.350	68.228±4.159	68.312±4.618

Methodology. This study is designed as a retrospective cross-sectional study. The subjects from Group-A, Experimental, were subjected to a 4 week Anuloma Viloma Pranayama (Alternate Nostril). This lasted 4 weeks and consisted of daily sessions. Hemoglobin was determined in the blood samples of all the subjects with the use of a hematology analyzer (Celldyne model 3500).

Blood samples (10 ml) for the determination of lipid profiles were obtained. All of biochemical tests have been done with serum samples. Lipid parameters (Triglyceride; Cholesterol; Low-density lipoprotein; High-density lipoprotein) were measured using Boehringer Mannheim kits and Clinilab, BioMerieux analyser as used by Jastrzebska et al. (12).

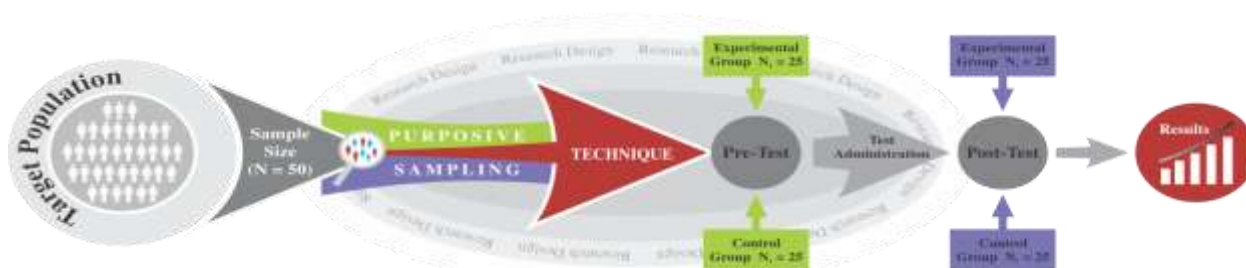


Figure 1. Study Design

Table II. Experimental treatment
4 Weeks - Anuloma Viloma Pranayama Training

Weeks	Schedule	Time	Duration
1 st Week	Preliminary Yogic Exercises	5 Minute	
	Practice of Anuloma Viloma Pranayama (9 Rounds X 1 Set)	10 Minute	
	Relaxation Posture	5 Minute	20 Minute
2 nd Week	Preliminary Yogic Exercises	5 Minute	
	Practice of Anuloma Viloma Pranayama (9 Rounds X 2 Set)	15 Minute	
	Relaxation Posture	5 Minute	25 Minute
3 rd Week	Preliminary Yogic Exercises	5 Minute	
	Practice of Anuloma Viloma Pranayama (9 Rounds X 3 Set)	20 Minute	30 Minute
	Relaxation Posture	5 Minute	
4 th Week	Preliminary Yogic Exercises	5 Minute	
	Practice of Anuloma Viloma Pranayama (9 Rounds X 4 Set)	25 Minute	35 Minute
	Relaxation Posture	5 Minute	

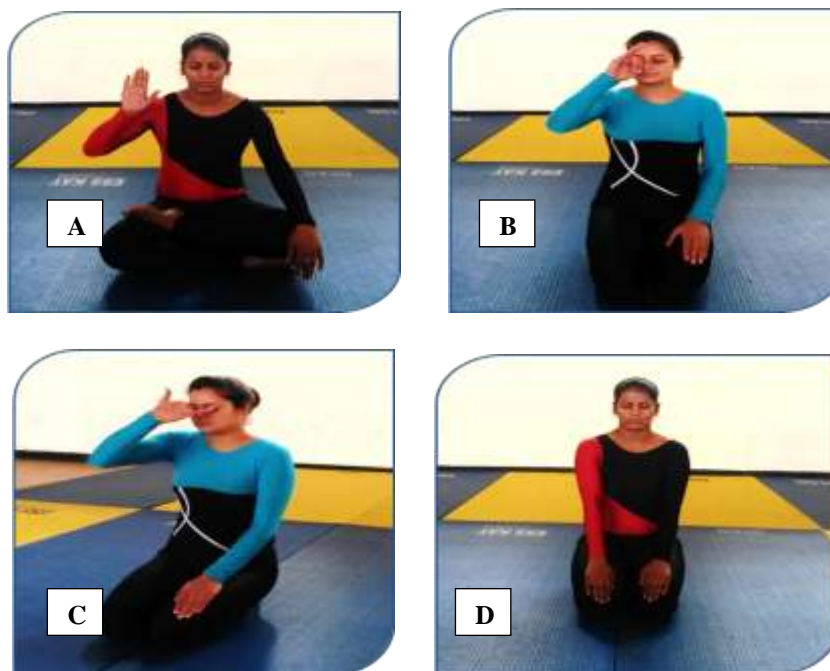


Figure 2. Subject Performing Anuloma Viloma Pranayama



Figure 3. Biochemical tests with Serum Samples

Statistical Analysis. Statistical analyses were performed using the Statistical Package for the Social Sciences for Windows version 16.0 software (SPSS Inc., Chicago, IL). Data is expressed as the mean \pm SD. Student t test for paired samples was utilized to compare the means of the pre-test and the post-test. The level of significance was set at 0.05.

Results

The results of Hematological Parameter (i.e., Hemoglobin (Hb), Total Cholesterol (TC), Low Density Lipoprotein Cholesterol (LDL-Cholesterol), High Density Lipoprotein Cholesterol (HDL-Cholesterol) and Triglycerides (TG) in university level girls are presented in table III.

Table III. Descriptive statistics (Mean, Standard Deviation) and Paired Sample t-test of hematological parameter

Group	Number	Hemoglobin (g/dl)			t-value	p-value
		Mean	Standard Deviation	Standard Error of the Mean		
Experiment (Pre-test)	25	12.920	0.670	0.134	0.592	0.559
Experimental (Post-test)	25	12.932	0.618	0.123		
Control (Pre-test)	25	13.092	0.778	0.155	0.401	0.692
Control (Post-test)	25	13.100	0.764	0.153		
Total Cholesterol (mg/dL)						
Experiment (Pre-test)	25	151.512	11.488	2.297	1.000	0.327
Experimental (Post-test)	25	151.532	11.458	2.291		
Control (Pre-test)	25	152.156	10.354	2.070	0.889	0.382
Control (Post-test)	25	152.268	10.246	2.049		
Low Density Lipoprotein Cholesterol (mg/dL)						
Experiment (Pre-test)	25	115.416	7.970	1.594	1.238	0.227
Experimental (Post-test)	25	115.440	7.974	1.594		
Control (Pre-test)	25	115.784	7.451	1.490	0.196	0.846
Control (Post-test)	25	115.788	7.516	1.503		
High Density Lipoprotein Cholesterol (mg/dL)						
Experiment (Pre-test)	25	71.804	5.457	1.091	1.890	0.070
Experimental (Post-test)	25	71.840	5.457	1.091		
Control (Pre-test)	25	68.640	4.728	0.945	1.429	0.165
Control (Post-test)	25	68.668	4.739	0.948		
Triglycerides (mg/dL)						
Experiment (Pre-test)	25	130.792	7.799	1.559	0.371	0.713
Experimental (Post-test)	25	130.800	7.838	1.567		
Control (Pre-test)	25	135.640	8.247	1.649	0.189	0.851
Control (Post-test)	25	135.644	8.237	1.647		

Hemoglobin (Hb), Total Cholesterol (TC), Low Density Lipoprotein Cholesterol (LDL-Cholesterol), High Density Lipoprotein Cholesterol (HDL-Cholesterol) and Triglycerides (TG) of University Level Girls

Hemoglobin (g/dl). The results of Hematological Parameter in group (Experimental) and group (Control) are shown in (Table III). The Mean and Standard Deviation values of Hemoglobin (Hb) of pre-test and post-test of experimental group was 12.920 ± 0.670 and 12.932 ± 0.618 respectively. However, the Mean and Standard Deviation values of Hemoglobin (Hb) of pre-test and post-test of control group were 13.092 ± 0.778 and 13.100 ± 0.764 . The t-value in case of experimental group was 0.592 and for control group it was 0.401. No significant between-group differences were noted in Hemoglobin (Hb) since the calculated value of ($t=0.592$) is smaller than tabulated value of $t_{0.05} (24) = 2.06$ for the selected degree of freedom and level of significance. The data does suggest that the differences between pre-test and post-test of Hemoglobin (Hb) in experimental and control group are insignificant.

Total Cholesterol (mg/dL). The Mean and Standard Deviation values of Total Cholesterol (TC) of pre-test and post-test of experimental group was 151.512 ± 11.488 and 151.532 ± 11.458 respectively. However, the Mean and Standard Deviation values of Total Cholesterol (TC) of pre-test and post-test of control group were 152.156 ± 10.354 and 152.268 ± 10.246 .

The t-value in case of experimental group was 1.000 and for control group it was 0.889. No significant between-group differences were noted in Total Cholesterol (TC) since the calculated value of ($t=1.000$) is smaller than tabulated value of $t_{0.05} (24) = 2.06$ for the selected degree of freedom and level of significance. The data does suggest that the differences between pre-test and post-test of Total Cholesterol (TC) in experimental and control group are insignificant.

Low Density Lipoprotein Cholesterol (mg/dL). The Mean and Standard Deviation values of Low Density Lipoprotein Cholesterol (LDL-Cholesterol) of pre-test and post-test of experimental group was 115.416 ± 7.970 and 115.440 ± 7.974 respectively. However, the Mean and Standard Deviation values of Low Density Lipoprotein Cholesterol (LDL-Cholesterol) of pre-test and post-test of control group were 115.784 ± 7.451 and 115.788 ± 7.516 . The t-value in case of experimental group was 1.238 and for control group it was 0.196. No significant between-group differences were noted in Low Density Lipoprotein Cholesterol (LDL-Cholesterol) since the calculated value of ($t=1.238$) is smaller than tabulated value of $t_{0.05} (24) = 2.06$ for the selected degree of freedom and level of significance.

The data does suggest that the differences between pre-test and post-test of in Low Density Lipoprotein Cholesterol (LDL-Cholesterol) in experimental and control group are insignificant. *High Density Lipoprotein Cholesterol (mg/dL).* The Mean and Standard Deviation values of High Density Lipoprotein Cholesterol (HDL-Cholesterol) of pre-test and post-test of experimental group was 71.804 ± 5.457 and 71.840 ± 5.457 respectively. However, the Mean and Standard Deviation values of High Density Lipoprotein Cholesterol (HDL-Cholesterol) of pre-test and post-test of control group were 68.640 ± 4.728 and 68.668 ± 4.739 . The t-value in case of experimental group was 1.890 and for control group it was 1.429. No significant between-group differences were noted in High Density Lipoprotein Cholesterol (HDL-Cholesterol) since the calculated value of ($t=1.890$) is smaller than tabulated value of $t_{0.05}(24) = 2.06$ for the selected degree of freedom and level of significance.

The data does suggest that the differences between pre-test and post-test of High Density Lipoprotein Cholesterol (HDL-Cholesterol) in experimental and control group are insignificant. *Triglycerides (mg/dL).* The Mean and Standard Deviation values of Triglycerides (TG) of pre-test and post-test of experimental group was 130.792 ± 7.799 and 130.800 ± 7.838 respectively. However, the Mean and Standard Deviation values of Triglycerides (TG) of pre-test and post-test of control group were 135.640 ± 8.247 and 135.644 ± 8.237 . The t-value in case of experimental group was 0.371 and for control group it was 0.189. No significant between-group differences were noted in Triglycerides (TG) since the calculated value of ($t=0.371$) is smaller than tabulated value of $t_{0.05}(24) = 2.06$ for the selected degree of freedom and level of significance. The data does suggest that the differences between pre-test and post-test of Triglycerides (TG) in experimental and control group are insignificant.

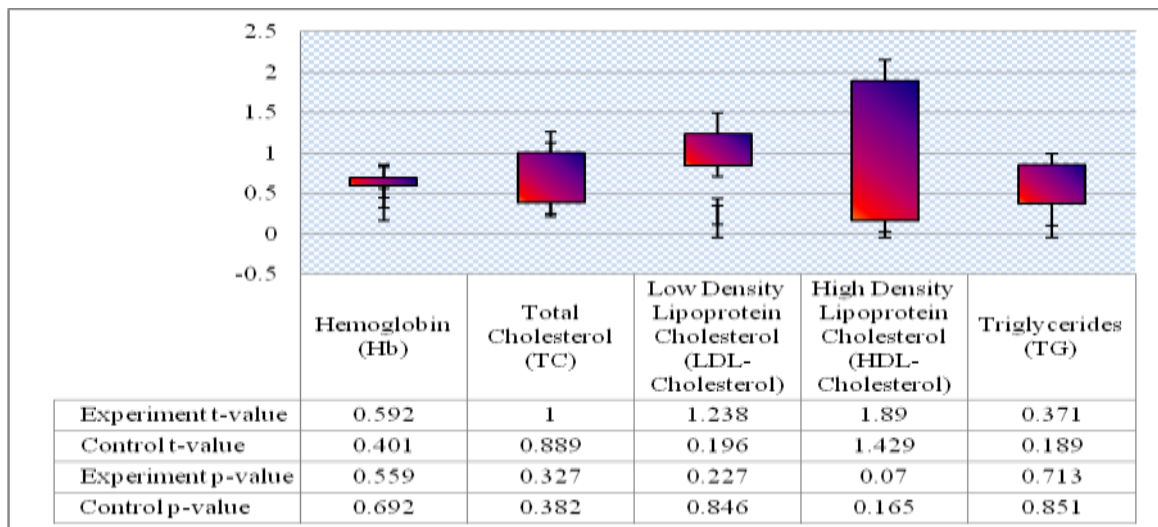


Figure 4. t-value and p-value for the Experimental (Pre-Test & Post-Test) and Control (Pre-Test & Post-Test) Groups Scores of Hematological Parameter

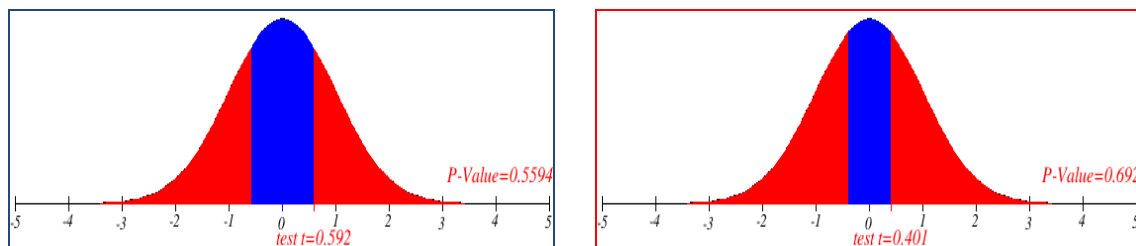


Figure 5. t-test and p-value for the Experimental (Pre-Test & Post-Test) and Control (Pre-Test & Post-Test) Groups on the parameter Hemoglobin (Hb)

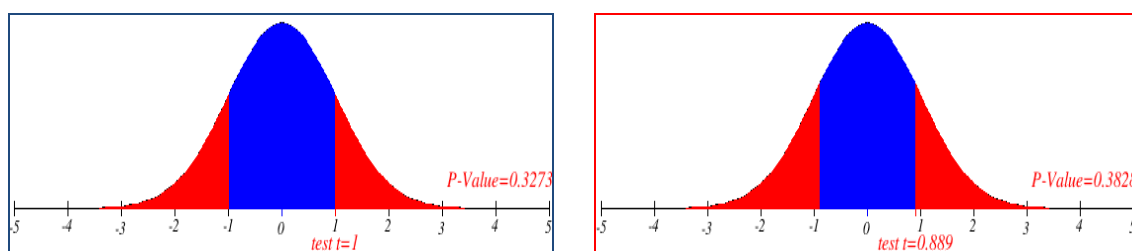


Figure 6. t-test and p-value for the Experimental (Pre-Test & Post-Test) and Control (Pre-Test & Post-Test) Groups on the parameter Total Cholesterol (TC)

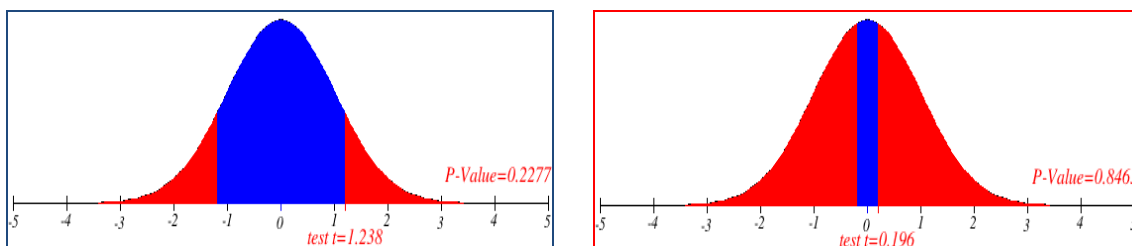


Figure 7. t-test and p-value for the Experimental (Pre-Test & Post-Test) and Control (Pre-Test & Post-Test) Groups on the parameter Low Density Lipoprotein Cholesterol (LDL-Cholesterol)

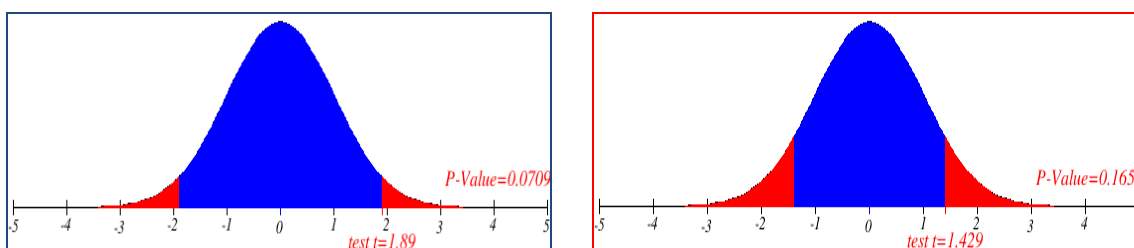


Figure 8. t-test and p-value for the Experimental (Pre-Test & Post-Test) and Control (Pre-Test & Post-Test) Groups on the parameter High Density Lipoprotein Cholesterol (HDL-Cholesterol)

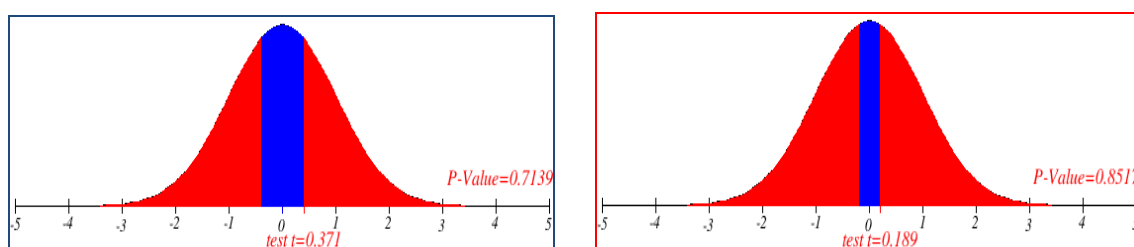


Figure 9. t-test and p-value for the Experimental (Pre-Test & Post-Test) and Control (Pre-Test & Post-Test) Groups on the parameter Triglycerides (TG)

Conclusion

This paper considers the evolution of Anuloma Viloma Pranayama on hematological parameters of university level girls. No significant differences were found in Hemoglobin (Hb), Total Cholesterol (TC), Low Density Lipoprotein Cholesterol (LDL-Cholesterol), High Density Lipoprotein Cholesterol (HDL-Cholesterol) and Triglycerides (TG) of University Level Girls.

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