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Effects of pranayama on breath-holding capacity, cardio-vascular endurance & reaction time of high school students in Punjab

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Abstract

The aim of the present study is to assess the effects of Pranayama on Breath-Holding Capacity, Cardio-Vascular Endurance & Reaction Time of high school students in Punjab. Two hundred boy's age group of 13 to 16 years from Govt. High School, Karala, Punjab and S.B.W.S.M.P. School, Banur, Punjab were selected as the research subjects. The Pranayama training duration was of 10-weeks. The subjects were divided into two groups as experimental (Group A) and control (Group B). The experimental group underwent Pranayama training for 10-weeks and control group did not receive the Pranayama training. The 't' test was used to compare pre and post-training values. After 10-weeks Pranayama training, there was a significant ($P < 0.001$) difference between pre and post-testing of experimental group for the breath-holding capacity (pre = 35.89 ± 1.55 , post = 36.92 ± 1.57), cardio-vascular endurance (pre = 1710.27 ± 50.73 , post = 1785.51 ± 78.24) and reaction time (pre = 24.81 ± 0.40 , post = 23.55 ± 0.43) as well as control group for the breath-holding capacity (pre = 34.28 ± 1.01 , post = 34.27 ± 1.02), cardio-vascular endurance (pre = 1580.94 ± 13.62 , post = 1498.17 ± 62.78) and reaction time (pre = 25.90 ± 0.50 , post = 25.83 ± 0.52). The experimental group had a significant improvement on Breath-Holding Capacity, Cardio-Vascular Endurance & Reaction Time than the control group.

Keywords: Pranayama, Reaction Time, School, Punjab

1. Introduction

Pranayama is a scientific way of life. It is an easier way of understanding and realizing the dimensions of consciousness. The word 'prana' is a combination of two syllables *pra*, and *na* and denotes constancy, being a force in constant motion. Whereas prana is the vital force, Pranayama is the process by which the internal pranic store is increased. Some people split the word 'pranayama' into prana and yama and define it as 'breath control'. However, it comprises the words prana and ayama which means 'pranic capacity or length'. Pranayama is a technique through which the quantity of prana in the body is activated to a higher frequency. By practising Pranayama certain amount of heat or creative force is generated throughout the entire body, influencing the existing quantum or prana. The science of Pranayama is based on retention of prana or kumbhaka towards this end. Due to fear of death even Brahma, the Lord of creation, keeps practicing Pranayama and so do many Yogis and Munis. Hence, it is recommended always to control the breath. "Even Brahma and other Gods in heaven devote themselves to practicing Pranayama because it ends the fear of death." (Svatmarama, 1985). The mortals should follow the same path and control the breath.

2. Material and Methods

This study was designed to evaluate the effects of 10-weeks daily practice [Except Sunday and holidays]. Effects of Pranayama on Breath-Holding Capacity, Cardio-Vascular Endurance & Reaction Time of high school students. Two hundred students, aged 13 to 16 years, studying in 6th to 10th class high school students were included. Groups of healthy students with no history of present and past illness were selected. Student 't' test was used to see the significant of mean differences between pre-test and post-test values.

3. Results

Computed 't' Ratio to see the Significance of Differences between Pre-Test and Post-Test Means of Experimental Group and the Control Group with regard to Breath-Holding Capacity has been in table 1.

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Table 1

Group	Number	Mean	S.D.	SEM	't' Value	P-value
Experimental (Pre-test)	100	35.89	1.55	0.15	5.46*	0.0001
Experimental (Post-test)	100	36.92	1.57	0.15		
Control (Pre-test)	100	34.28	1.01	0.10	0.17	0.8626
Control (Post-test)	100	34.27	1.02	0.09		

$t_{.05 (99)} = 1.65$

Table-1 presents the results of experimental group and the control group with regard to the variable Breath-Holding Capacity. The descriptive statistics shows the Mean and SD values of Breath-Holding Capacity of pre-test and post-test of experimental group was 35.89 ± 1.55 and 36.92 ± 1.57 respectively, whereas the Mean and SD values of Breath-Holding Capacity of pre-test and post-test of control group was 34.28 ± 1.01 and 34.27 ± 1.02 . The "t" value in case of experimental group was 5.46* and for control group it was

0.17. The "t" value in case of experimental group 5.46* as shown in the table was found statistically significant as it was greater than the table value of $t = 1.65$ which shows that Breath-Holding Capacity of the experimental group was improved due to 10-weeks training of Pranayama. But in case of control group there was no improvement in the Breath-Holding Capacity as the calculated value of $t = 0.17$ was less than the table value required to be significant at .05 level of significance.

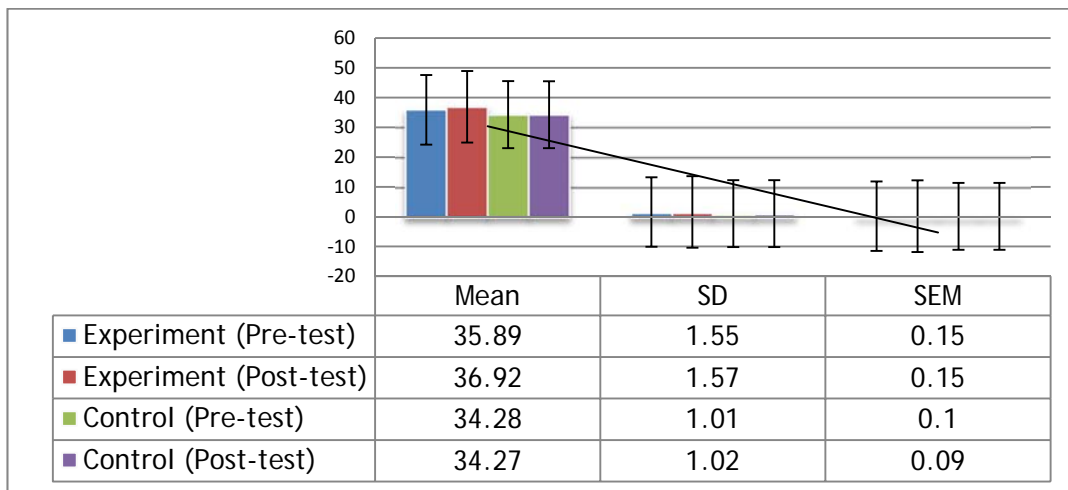


Fig 1: Mean, Standard Deviation (SD), Standard Error of Mean (SEM) of Breath-Holding Capacity of Experimental and Control Group.

Computed 't' ratio to see the Significance of Differences between Pre-Test and Post-Test Means of Experimental

Group and the Control Group with regard to Cardio-Vascular Endurance has been in table 2.

Table 2

Group	Number	Mean	S.D.	SEM	't' Value	P-value
Experiment (Pre-test)	100	1710.27	50.73	5.07	8.15*	0.0001
Experimental (Post-test)	100	1785.51	78.24	7.82		
Control (Pre-test)	100	1580.94	13.62	1.36	12.86*	0.0001
Control (Post-test)	100	1498.17	62.78	6.27		

$t_{.05 (99)} = 1.65$

Table-2 presents the results of experimental group and the control group with regard to the variable Cardio-Vascular Endurance. The descriptive statistics shows the Mean and SD values of Cardio-Vascular Endurance of pre-test and post-test of experimental group was 1710.27 ± 50.73 and 1785.51 ± 78.24 , respectively whereas the Mean and SD values of Cardio-Vascular Endurance of pre-test and post-test of control group was 1580.94 ± 13.62 and 1498.17 ± 62.78 . The "t" value in case of experimental group was 8.15* and for control group it was 12.86. The "t"-value in case of

experimental group 8.15* as shown in the table was found statistically significant as it was greater than the table value of $t = 1.65$, which shows that Cardio-Vascular Endurance of the experimental group was improved due to 10-weeks training of Pranayama. In case of control group there was also a significant difference. But when we see the mean values, it is found that there was a decrease in the mean value of post-test that may be one of the reasons for this type of results.

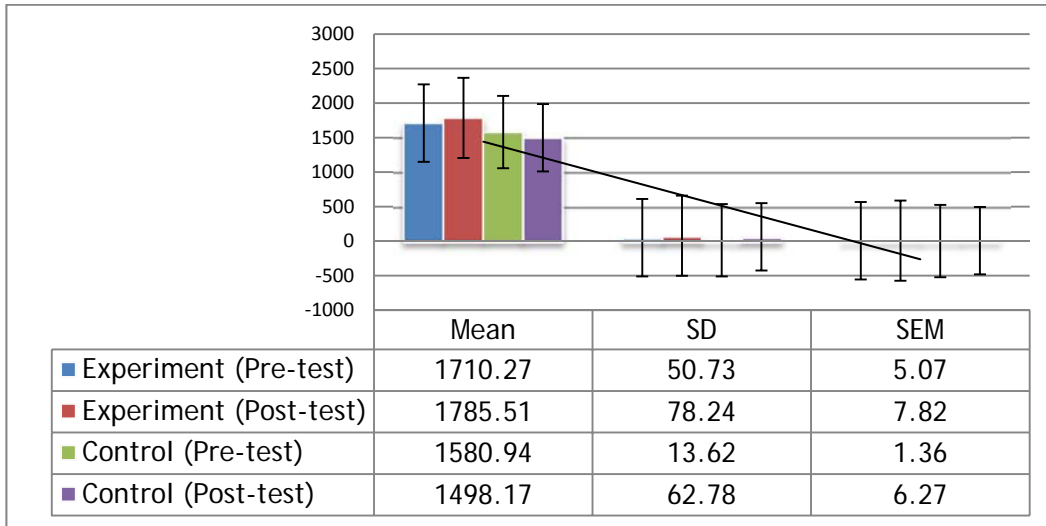


Fig 2: Mean, Standard Deviation (SD), Standard Error of Mean (SEM) of cardio-vascular endurance of Experimental and Control Group.

Computed 't' Ratio to see the Significance of Differences between Pre-Test and Post-Test Means of Experimental Group and the Control Group with regard to Reaction Time has been in table 3.

Table 3

Group	Number	Mean	S.D.	SEM	't' Value	P-value
Experiment (Pre-test)	100	24.81	0.40	0.04	12.66*	0.0001
Experimental (Post-test)	100	23.55	0.43	0.04		
Control (Pre-test)	100	25.90	0.50	0.05	1.51	0.1345
Control (Post-test)	100	25.83	0.52	0.05		

$t_{.05} (99) = 1.65$

Table-3 presents the results of experimental group and the control group with regard to the variable Reaction Time. The descriptive statistics shows the Mean and SD values of Reaction Time of pre-test and post-test of experimental group was 24.81 ± 0.40 and 23.55 ± 0.43 respectively, whereas the Mean and SD values of Reaction Time of pre-test and post-test of control group was 25.90 ± 0.50 and 25.83 ± 0.52 . The "t" value in case of experimental group was 12.66* and for control group it was 1.51. The "t"-value in case of

experimental group 12.66* as shown in the table was found statistically significant as it was greater than the table value of $t = 1.65$, which shows that Reaction Time of the experimental group decreased due to 10-weeks training of Pranayama. But in case of control group there was no decrease in the Reaction Time as the calculated value of $t = 1.51$ was less than the table value required to be significant at .05 level of significance.

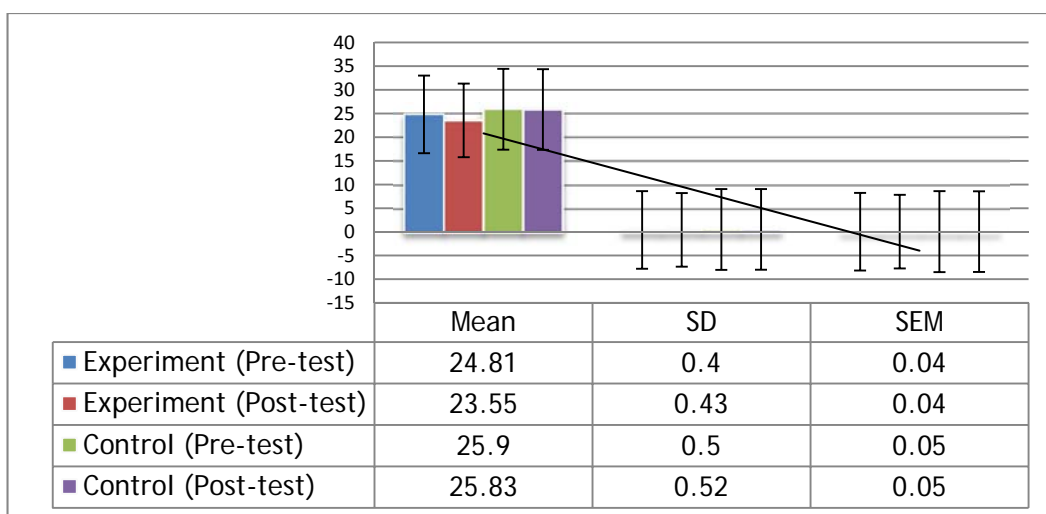


Fig 3: Mean, Standard Deviation (SD), Standard Error of Mean (SEM) of Reaction Time of Experimental and Control Group.

4. Discussion

The study was aimed to find out the effects of Pranayama on Breath-Holding Capacity, Cardio-Vascular Endurance & Reaction Time of high school students in Punjab. Results

pertaining to Breath Holding Capacity showed that there were significant differences between pre and post-test for experimental group and for control group it was found insignificant, which indicates that there was a significant role

of Pranayama on Breath-Holding Capacity of high school students, the findings are in line with the findings of Dabal (2003) who investigated the relationship of Breath-Holding Capacity with pulmonary function and reported in his findings significant relationship between Breath-Holding Capacity with Pulmonary Function of male students.

In a different study Upadhyay *et al.* (2008) also reported same type of results; they studied the effects of Pranayama on Breath-Holding Capacity and found significant relationship between Pranayama and Breath-Holding Capacity of the subjects. Sisodia and Tomar (2009) in their investigation found contradict results, as they reported that there was no significant effect of Anuloma-Viloma Pranayama on Breath-Holding time.

The results pertaining to the Cardio-Vascular Endurance showed that there was significant difference found between pre and post-test for experimental group and for control group it was found insignificant, which indicates that there was a significant role of Pranayama on Cardio-Vascular Endurance of high school students, the findings are supported by the findings of Ganguly and Gharate (1974) who studied the effect of yogic training on Cardio-Vascular Efficiency of male students, and reported daily one hour of yogic training improved cardio-vascular efficiency of the subjects.

In a different study, Lolage and Berra (1999) conducted a study to find out the effects of Pranayama on Cardio-Vascular Endurance of Kho-Kho players and reported in their findings that Pranayams were useful in improving Cardio-Vascular Endurance of Kho-Kho players. Udupa *et al.* (2003) also conducted a study to see the effects of Pranayama training on Cardiac Function of young person's; they found Pranayama Training modulates ventricular performance by increasing Parasympathetic Activity and decrease Sympathetic Activity.

Udupa *et al.* (2005) in their study worked to find out the effects of Slow and Fast Pranayama on Cardio-Respiratory Function and concluded that different types of Pranayama produce different physiological response in normal young persons. Abraham (2000) investigated the effects of different Pranayama techniques on Cardio-Respiratory Endurance and reported no significant relationship between Pranayama and Cardio-Respiratory Endurance his findings are contradicts our findings.

The results pertaining to the Reaction Time showed that there was a significant difference between pre and post-test for experimental group, and for control group it was found insignificant, which indicates that there was a significant role of Pranayama on Reaction Time of high school students, the findings are supported by the findings of Thombre *et al.* (1992) who worked to find out the effects of Yoga Training on Reaction Time, they documented in their findings that there was significant relation of Yoga training with the Reaction Time. This finding is in line with the findings of our study. Udupa *et al.* (2005) also conducted a study to find out the effects of different Pranayama techniques on Reaction Time, they reported that there was a significant effect of Pranayama technique on Reaction Time and supports our findings.

5. Conclusions

On the basis of the obtained results the following conclusions were drawn:-

1. The results suggest that 10-weeks training programme of Pranayama improved Breath-Holding Capacity of high school students. There is a significant role of Pranayama to improve our Breath-Holding Capacity.
2. It is also concluded that 10-weeks training programme of Pranayama improved Cardio-Vascular Endurance of high school students.
3. It is further concluded that training programme of 10-weeks of Pranayama decrease Reaction Time of high school students.

On the final note, it can conclude that regular practice of Pranayama is helpful to improve Breath-Holding Capacity, Cardio-Vascular Endurance & decrease Reaction Time. Thus it is suggested that to be in good shape of health status, one must regularly practice yogic asanas and pranayams.

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