International Journal of Multidisciplinary Trends

E-ISSN: 2709-9369
P-ISSN: 2709-9350
Impact Factor (RJIF): 6.32
www.multisubjectjournal.com
IJMT 2025; SP-7(11): 01-04
Received: 01-08-2025
Accepted: 05-09-2025

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Effect of pranayama practice on heart rate and blood pressure among pre metric boys hostel Raichur

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DOI: https://www.doi.org/10.22271/multi.2025.v7.i11a.850

Abstract
This study aimed to determine the impact of a six-week regimen of Pranayama practice on physiological indicators such as heart rate and blood pressure. A total of 30 male students, aged 13 to 16 years, were randomly selected from Dr. B.R. Ambedkar Pre-Metric Boys' Hostel in Raichur, Karnataka. The study considered Pranayama practice as the independent variable, while heart rate and blood pressure served as the dependent variables. Data collection was conducted through pre- and post-test evaluations. A single-group experimental design was employed, where pre-tests were conducted before initiating the Pranayama practice, and post-tests were conducted after six weeks. The paired t-test and descriptive analysis were used at a 0.05 significance level to compare pre- and post-test means for heart rate and blood pressure. The findings revealed a statistically significant difference in both heart rate and blood pressure between the pre- and post-test results. These results suggest that Pranayama practice could be a contributing factor to improvements in physiological measures such as heart rate and blood pressure.

Keywords: Pranayama, physiological variables, heart rate, blood pressure, yoga, systolic blood pressure, diastolic blood pressure, Anulom Vilom, Bhramari pranayama, Bhastrika Pranayama, Kapalabhati, cardiovascular health

1. Introduction
Pranayama is a precise practice of breath regulation and control, involving the cessation of inhalation and exhalation after establishing a stable posture (Asana). It is deeply rooted in ancient traditions and is considered a vital force that sustains life. The Sanskrit word "Prana" translates to vital energy or life force, while "Ayama" means control. Thus, Pranayama refers to the practice of controlling vital energy through regulated breathing.
Pranayama plays a crucial role in enhancing physical, mental, and spiritual well-being. It encompasses different movements of the thoracic organs, including vertical ascension, horizontal expansion, and circumferential motion. While adults commonly practice Pranayama, it is equally beneficial for children. When introduced appropriately, it can enhance children's physical coordination, strength, and concentration. Regular engagement in Pranayama fosters a sense of balance between the body, mind, and spirit. These breathing techniques have become widely accepted as essential components of mental and physical training across the globe.
Children, in particular, can benefit significantly from practicing basic breathing techniques without breath retention. Such methods help them develop focus, self-regulation, and calmness, enabling them to manage impulsivity more effectively.

1.1 Objectives of the Study
- To determine the significant difference in heart rate before and after Pranayama practice.
- To evaluate the significant difference in systolic blood pressure before and after Pranayama practice.
- To assess the significant difference in diastolic blood pressure before and after Pranayama practice.

2. Methodology
2.1 Selection of Subjects
This study included 30 randomly selected male students, aged 13-16 years, from Dr. B.R. Ambedkar Pre-Metric Boys' Hostel, Raichur, Karnataka.

2.2 Selection of Variables

- **Independent Variable:** Pranayama practice.
- **Dependent Variables:** Heart rate and blood pressure.

2.3 Criterion Measures

- Heart rate was measured by gently pressing the radial artery for one minute using a stopwatch.
- Blood pressure was measured using a sphygmomanometer, which records values in millimeters of mercury (mmHg).

2.4 Experimental Design and Training Schedule

A single-group design was employed, where pre-tests were conducted before the initiation of Pranayama practice and post-tests were conducted after six weeks of training.

Participants engaged in six weekly sessions of Pranayama practice, following a structured schedule:

- 15 minutes of Anulom Vilom, Surya Bhedana, and Chandra Bhedana Pranayama with dynamic breathing exercises.
- 20 minutes of Bhramari, Bhastrika, and Kapalabhati Pranayama.
- 10 minutes of additional Anulom Vilom Pranayama practice.

Prior to participation, subjects were informed about the study objectives, and written consent was obtained. Detailed demonstrations and explanations of the Pranayama techniques were provided

2.5 Statistical Procedure

The data were analyzed by applying descriptive statistical and paired t-test. The level of significance was set at 0.05 and the data were analyzed by applying descriptive statistical and paired t-test. The level of significance was set at 0.05 analyzed in the SPSS software.

2.6 Result and Findings of the Stud

Interpretation of the Data (Paired t-test Results)

This study examined the effect of six weeks of Pranayama practice on systolic blood pressure, diastolic blood pressure, and heart rate in 30 male students. The paired t-test results for these physiological parameters are analyzed below.

1. Systolic Blood Pressure (SBP)

Table 1: Paired t-test Analysis for Systolic blood pressure

Variables	Test	N	Mean	Std. Error Mean	Paired Differences		t	df	Sig. (2-tailed)
					Mean	Std. Error Mean			
Systolic blood pressure	Pre	30	103.4000	2.23997	23.900	2.47626	-9.652	29	.000
	Post	30	127.300	.89590					

The mean difference (23.90 mmHg) shows a significant increase in systolic blood pressure after six weeks of Pranayama practice. The t-value (-9.652) is large in magnitude, indicating a strong difference between pre-test and post-test SBP. The p-value (0.000) is highly significant (p<0.05), suggesting that the observed change is not due to chance but a real effect of Pranayama practice.

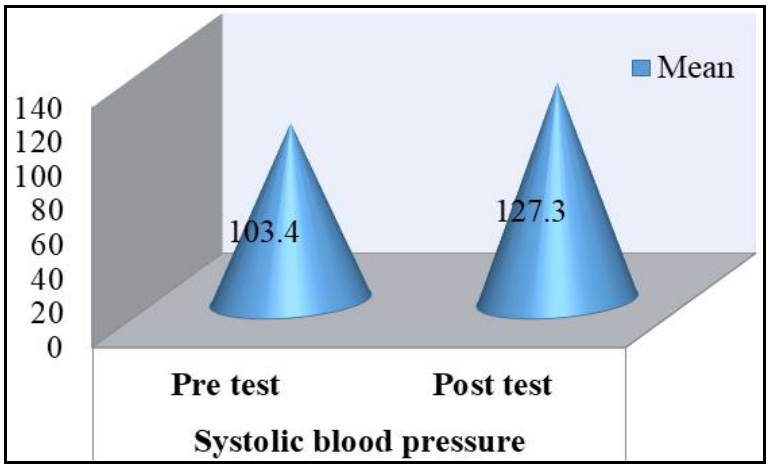


Fig 1: Graphical representation of the mean SBP values of pre and post test evaluations.

2. Diastolic blood pressure

Table 2: Descriptive and comparative statistics of pre and post test of DBP

Variables	Test	N	Mean	Std. Error Mean	Paired Differences		t	df	Sig. (2-tailed)
					Mean	Std. Error Mean			
Diastolic blood pressure	Pre test	30	69.7333	2.43628	-14.56667	2.59606	-5.61	29	.000
	Post test	30	84.3000	1.05607					

The mean difference (-14.57 mmHg) indicates that post-test diastolic blood pressure was significantly higher than pre-test DBP. The t-value (-5.611) suggests a strong statistical difference. The p-value (0.000) is highly significant, indicating that the increase in diastolic blood pressure is statistically meaningful.

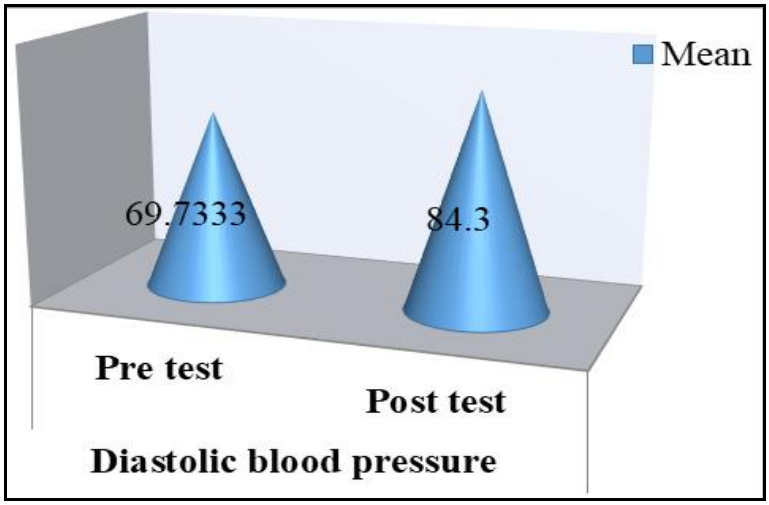


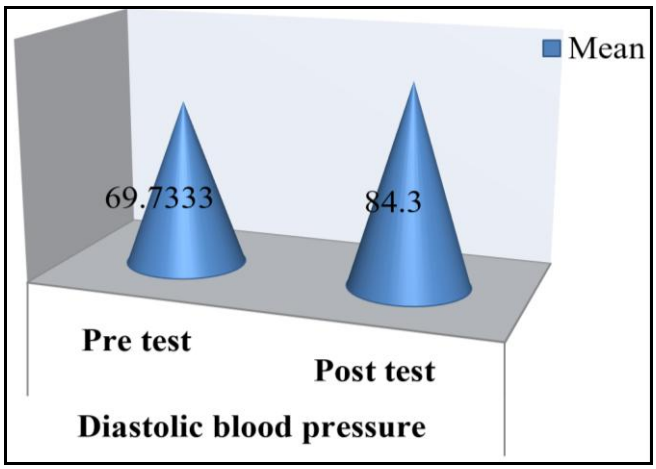
Fig 2: Graphical representation of the mean DBP values of pre and post test evaluations.

3. Heart rate

Table 3: Paired t-test Analysis for heart rate

Variables	Test	N	Mean	Std. Error Mean	Paired Differences		t	df	Sig. (2-tailed)
					Mean	Std. Error Mean			
Heart rate	Pre test	30	82.46	1.73	4.46	1.97	2.25	29	.032
	Post test	30	78.00	1.51					

The mean difference (-4.4667 bpm) suggests a decrease in heart rate after six weeks of Pranayama practice. The t-value (2.256) indicates a moderate difference. The p-value (0.032) is significant (p<0.05), indicating a statistically meaningful reduction in heart rate.



3. Analysis of the Results

The study's findings showed that the chosen group's systolic blood pressure diastolic blood pressure and heart rate significantly improved as a result of 6 weeks Pranayama Practice. When comparing the pre and post tests, the group that participated in Pranayama Practice showed a substantial improvement in a few physiological indicators, including systolic blood pressure diastolic blood pressure and heart rate.

4. Conclusions

The study's findings allow for the following deductions to be made:

1. The study's findings show that there was a substantial change between the systolic blood pressure test conducted before and after.
2. The study's findings show a substantial difference between the diastolic blood pressure test conducted before and after.
3. The study's findings show that there was a substantial change between the heart rate test conducted before and after.

Overall Conclusion

- Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) increased significantly after six weeks of Pranayama practice (p<0.05).
- Heart Rate (HR) showed a statistically significant reduction, suggesting improved cardiovascular efficiency.
- The significant changes indicate that Pranayama practice influences cardiovascular parameters, possibly by enhancing autonomic nervous system balance, circulation, and oxygenation

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