Biomedical and Biopharmaceutical Research
Abbreviation: Biomed. Biopharm. Res.
Volume: 22: Issue: 02 |Year: 2025
Page Number: 427-430

Study of effect of Yoga & Meditation on cardiovascular parameters

Dr. Swati Devendra Kulsange
Associate Professor, Dept. of Physiology, Smt. Sakhubai Narayanrao Katkade Medical College & Research Center, Kokamthan, Ahilyanagar, Maharashtra

Corresponding Author

Dr. Swati Devendra Kulsange
Associate Professor, Dept. of Physiology, Smt. Sakhubai Narayanrao Katkade Medical College & Research Center, Kokamthan, Ahilyanagar, Maharashtra

Article Received:27-06-2025

Article Accepted:20-07-2025

ABSTRACT

Introduction: Cardiovascular disorders are rising, and yoga and meditation offer safe, non-pharmacological solutions. These practices enhance autonomic function and cardiovascular health, with effects influenced by age and gender.

Aim & Objective: To evaluate correlations between demographic variables (age, gender) and cardiovascular parameters (pulse rate, SBP, DBP) in individuals regularly practicing yoga and meditation.

Materials and Methods: A prospective study of 60 healthy participants (30 males, 30 females), aged 25–40, practicing yoga and meditation for over six months. Parameters were recorded before and after the intervention using standardized protocols.

Observations and Results: Significant reductions were observed in pulse rate, systolic and diastolic BP post-intervention ($P < .00001$). While both genders benefitted, age group 36–40 showed heightened baseline values and stronger autonomic responsiveness.

Conclusion: Regular yoga and meditation significantly improve cardiovascular regulation across ages and genders. These findings reinforce their role as effective preventive tools in healthy adults.

Keywords: Yoga, Meditation

INTRODUCTION

The increasing prevalence of cardiovascular disorders has prompted growing interest in non-pharmacological interventions that promote heart health. Among these, yoga and meditation have emerged as accessible, holistic modalities with proven physiological benefits[1]. These mind-body practices have demonstrated potential to modulate autonomic function, reduce stress, and improve cardiovascular efficiency[2]. Numerous studies have highlighted the efficacy of yoga and meditation in reducing sympathetic activity, lowering resting heart rate, and improving blood pressure control[3]. These practices work synergistically through breath regulation, mindfulness, and physical postures, offering therapeutic benefits without adverse effects[4]. Moreover, the role of neurocardiac integration—via enhanced parasympathetic stimulation—is gaining recognition as a core mechanism in these interventions[5]. Understanding how demographic factors influence the cardiovascular outcomes of yoga and meditation is essential for targeted interventions and public health strategies. While previous literature has established general physiological responses to these practices[6], there remains a need to correlate specific demographic variables—such as age and gender—with cardiovascular shifts in healthy populations[7]. Such stratified analysis can help personalize preventive care and optimize outcomes. This study was designed to correlate age, gender, and cardiovascular parameters—namely pulse rate, systolic, and diastolic blood pressure—with the consistent practice of yoga and meditation over six months in healthy individuals aged 25–40. By evaluating demographic trends alongside physiological metrics, the research aims to reveal nuanced patterns of response that could inform future therapeutic guidelines and support evidence-based integration of yoga and meditation into clinical wellness programs[8].

AIM & OBJECTIVE

To study correlation of demographic & cardiovascular parameters with practice of Yoga & Meditation

MATERIAL AND METHODS

After securing institutional ethics committee approval, a cross-sectional prospective study was conducted between 2022 and 2023 to assess the correlation between demographic variables and cardiovascular parameters in individuals practicing yoga and meditation. A total of **60 healthy participants** (30 males and 30 females), aged **25 to 40 years**, were enrolled based on inclusion criteria. Eligibility required participants to have engaged in yoga or meditation for more than

6 months and to be free of any serious medical conditions such as tuberculosis, thyroid abnormalities, bronchial asthma, neuromuscular diseases, or recent major surgical history. Participants also had no history of smoking or alcohol intake. Written informed consent was obtained from all enrolled subjects. All cardiovascular measurements—including pulse rate, systolic blood pressure (SBP), and diastolic blood pressure (DBP)—were recorded using a validated digital sphygmomanometer in a seated position after a minimum rest period of 10 minutes. Readings were taken at consistent morning times to reduce diurnal variability, with participants refraining from caffeine or physical exertion beforehand. Participants engaged in a structured yoga and meditation regimen for at least six months prior to enrollment. Sessions included a standardized daily routine (6 days/week, 1 hour/day), integrating Surya Namaskar, selected asanas (e.g., Bhujangasana, Shavasana), pranayama techniques (e.g., Anulom Vilom, Kapalbhati, Bhramari), and brief guided meditation or Om chanting. All sessions were conducted under supervision of certified instructors following protocols similar to those implemented in previous trials.

Assessment Protocol

- **Demographic Categorization**: Participants were stratified by age into three groups—25–30, 31–35, and 36–40 years—to explore distribution trends (Table 1).
- **Baseline and Follow-Up Measurements**: Cardiovascular parameters were recorded before and after yoga/meditation sessions, including:
- **Pulse rate (/min)**
- **Systolic Blood Pressure (SBP) (mmHg)**
- **Diastolic Blood Pressure (DBP) (mmHg)**

These measurements were evaluated to detect differences and improvements attributable to sustained yogic practice (Table 2).

Analytical Comparisons

- **Gender-Based Analysis**: Comparative assessment of cardiovascular parameters between male and female participants was performed. While both groups showed improvement post-intervention, statistical significance for inter-gender differences was observed only for diastolic blood pressure after yoga/meditation (Table 3).
- **Age-Based Correlation**: Cardiovascular outcomes were also analyzed across the three defined age brackets. Older participants (36–40 years) exhibited higher baseline readings; however, all age groups demonstrated consistent reductions after intervention. Pulse rate changes were statistically significant, indicating greater responsiveness in autonomic function among older participants (Table 4).

All data were expressed as **mean ± standard deviation (SD)** and analyzed using **SPSS version 20**. Unpaired *t*-tests and Chi-square tests were applied to determine significance, with a threshold of **P < 0.05** considered statistically significant

OBSERVATION AND RESULT

Table 1: Demographic Variables

Sr No	Age (Years)	Gender		Total n (%)
		Male n (%)	Female n (%)	
1	**25 to 30**	12 (20 %)	9 (15 %)	21 (35 %)
2	**31 to 35**	7 (11 %)	12 (20 %)	19 (31 %)
3	**36 to 40**	11 (19 %)	9 (15 %)	20 (34 %)
Total n (%)		30 (50 %)	30 (50 %)	60 (100 %)

Participants were evenly split by gender (30 males, 30 females). Age groups were balanced: 25–30 (35%), 31–35 (31%), 36–40 (34%), allowing for representative age-wise analysis.

Table 2: Cardiovascular Variables

Sr No	Parameters	Before yoga/Meditation Mean ± SD	After yoga/Meditation Mean ± SD	P value
1	**Pulse rate (/min)**	77.21±5.24	70.2±3.31	**< .00001 (S)**
2	**Systolic blood pressure (mmHg)**	135±3.44	127.1±3.34	**< .00001 (S)**
3	**Diastolic blood pressure (mmHg)**	85.16±3.51	76.96±3.40	**< .00001 (S)**

Pulse Rate, SBP, and DBP all showed highly significant reductions after yoga/meditation (P < .00001). This supports the intervention's role in improving autonomic and cardiovascular stability.

Table 3: Correlation of Gender & Cardiovascular Variables

Sr No	Gender	Before yoga/Meditation Mean ± SD			After yoga/Meditation Mean ± SD		
		PR	**SBP**	**DBP**	**PR**	**SBP**	**DBP**
1	**25 to 30**	71.47±3.98	134.57±3.47	85.42±3.47	66.71±2.84	126.85±3.19	77.33±3.36
2	**31 to 35**	78.52±1.21	135.05±3.42	84.94±3.42	70.94±1.02	127.05±3.42	76.94±3.42
3	**36 to 40**	82±2.29	135.4±3.56	85.1 ±3.80	73.15±1.22	127.4±3.56	76.6±3.56
P value		**< .00001 (S)**	**0.27 (NS)**	**0.29 (NS)**	**< .00001 (S)**	**0.25 (NS)**	**0.20 (NS)**

Both males and females experienced favorable changes in pulse and BP. Inter-gender differences were not statistically significant, indicating uniform benefit across sexes.

Table 4: Correlation of age & Cardiovascular Variables

Sr No	Age (Years)	Before yoga/Meditation Mean ± SD			After yoga/Meditation Mean ± SD		
		PR	**SBP**	**DBP**	**PR**	**SBP**	**DBP**
1	**Male**	77.14±5.62	134.68±3.36	85.48±3.39	70.00±3.4071	126.80±3.24	77.27±3.32
2	**Female**	78.84±4.72	136.15 ±3.60	84.0±3.82	70.92±2.98	127.84±3.86	74.307±4.819
P value		**0.21 (NS)**	**0.12 (NS)**	**0.18 (NS)**	**0.45 (NS)**	**0.37 (NS)**	**0.03 (S)**

Older individuals (36–40 years) had higher baseline values. All age groups showed consistent post-intervention reductions. Pulse rate improvement was statistically significant, suggesting better autonomic responsiveness in older participants.

DISCUSSION

In the present study, demographic distribution is balanced across three age groups: 25–30 (35%), 31–35 (31%), and 36–40 years (34%), with an equal number of males and females (n = 30 each). A study by Maini et al. reported a balanced gender distribution among yoga practitioners aged 25–50, with slightly higher male participation[9]. Sukumaran et al. noted that yoga benefits spanned all age groups, with increased cardiovascular responsiveness observed in participants aged 35–45[10]. In the present study, mean pulse rate significantly declines from 77.21 ± 5.24 to 70.2 ± 3.31 bpm after yoga and meditation. Systolic BP reduces from 135 ± 3.44 to 127.1 ± 3.34 mmHg, and diastolic BP drops from 85.16 ± 3.51 to 76.96 ± 3.40 mmHg (P < .00001), indicating enhanced cardiovascular control. Sharma et al. found significant reductions in LDL, total cholesterol, and systolic blood pressure after 30 days of Common Yoga Protocol practice among healthy adults[11]. Garnier-Crussard et al. observed improved diastolic blood pressure in older adults following an 18-month meditation program, especially in those with higher baseline cardiovascular risk[12]. In the present study, both genders exhibit improvement in pulse rate and blood pressure following yoga and meditation. However, the gender-wise difference remains statistically non-significant for SBP and DBP, suggesting uniform physiological benefit. Herur et al. reported greater reductions in heart rate and diastolic BP among females compared to males after 6 months of yoga practice, though systolic BP improvements were similar across genders[13]. Wong et al. found that aged female yoga practitioners had better heart rate variability and sleep latency than non-practicing counterparts, suggesting enhanced autonomic balance[14]. In the present study, older participants (36–40 years) show higher baseline pulse and BP values compared to younger groups. Post-intervention reductions are consistent across all age brackets, with pulse rate changes showing statistical significance. Sharma et al. noted that younger participants (20–40 years) showed more pronounced lipid profile improvements than older groups after yoga intervention[11]. Manchanda & Madan highlighted that older adult practicing yoga experienced modest but consistent reductions in blood pressure and improved metabolic parameters over time[15].

CONCLUSION

In the present study, regular practice of yoga and meditation leads to statistically significant reductions in pulse rate, systolic, and diastolic blood pressure. These cardiovascular benefits are consistent across genders and age groups, with older participants showing higher baseline values yet demonstrating comparable post-intervention improvements. The findings suggest that yoga and meditation are effective non-pharmacological tools for enhancing autonomic and cardiovascular regulation in healthy adults aged 25–40.

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