European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 9, Issue 4, Summer 2022

ORIGINAL RESEARCH

ASSESSMENT OF EFFECT OF YOGA ON AUTONOMIC NERVOUS SYSTEM OF HUMAN BODY

Dr Naveen Bhartia Porwal

Associate Professor and Head, Deptt of Physiology, ASJSATDS Medical College FatehPur, UP, India

Correspondence:
Dr Naveen Bhartia Porwal
Associate Professor and Head, Deptt of Physiology, ASJSATDS Medical College FatehPur, UP, India

ABSTRACT

Background: The autonomic nervous system plays a major part in preparing the human body to adapt to the constant environmental changes and stress by correcting the sensory, visceral, motor, and neuro endocrine functions. The present study was conducted to assess effect of yoga on autonomic nervous system of human body.

Materials & Methods: 80subjects of both genders were divided into 2 groups. Group I were on regular yoga and group II had healthy subjects who do not practice yoga (control). Anthropometric measurements like height, weight was taken. BMI was calculated, and recordings of AFT were done in the morning.

Results: Group I had 22 males and 18 females and group II had 20 males and 20 females. The mean age of group I was 18.6 years and in group II was 20.4 years. The mean height was 164.2 cm in group I and 165.3 cm in group II. The mean weight was 53.2 Kgs in group I and 57.5 Kgs in group II. The mean BMI was 20.1 Kg/cm2 in group I and 21.3 Kg/cm2 in group II. The difference was non- significant (P>0.05). The resting HR (bpm) was 80.3 and 69.4, DBT (bpm) was 1.43 and 1.72, 30:15 ratio (bpm) was 1.12 and 1.26, VR (bpm) was 1.52 and 1.81, HGT (mm Hg) was 16.8 and 10.2 and BP response to standing (mm Hg) was 6.32 and 8.43 in group I and II respectively. The difference was non- significant (P>0.05).

Conclusion: Regular long-term yoga training showed significant effects which streamline autonomic functions that help to prevent lifestyle diseases and their complications.

Key words: Autonomic functions, Resting HR, Yoga

INTRODUCTION

Cardiovascular functions are controlled by neural factors as well as others such as temperature, hormones, etc., Of these, neural factors primarily concern the autonomic nervous system (ANS), which plays a major role in maintaining and regulating cardiac functions, e.g., systolic blood pressure (SBP), diastolic blood pressure (DBP) and heart rate

(HR).[1] Imbalances in these lead to cardiovascular disorders such as hypertension, ischemia, infarction, etc., Numerous studies indicate a strong association between compromised ANS (e.g., decreased vagal activity or increased sympathetic activity) and sudden and non-sudden cardiac death.[2]

The autonomic nervous system plays a major part in preparing the human body to adapt to the constant environmental changes and stress by correcting the sensory, visceral, motor, and neuro-endocrine functions.[3] Thus, imbalance in the autonomic nervous system with sympathetic overactivity gives rise to hypertension, arrhythmias, and metabolic dysfunction. It is known that cardiovascular diseases are the foremost cause of morbidity and mortality in developed as well as developing countries.[4]

Yoga with factually supported interventions that are almost available to everyone, maybe uniquely beneficial for individuals looking for ways to improve their mental and physical health. Many previous studies have shown positive findings on the outcome of regular yoga practices, and a majority of these studies have shown the short-term effect of various yogic techniques in a healthy population and in various disease conditions.[5]The present study was conducted to assess effect of yoga on autonomic nervous system of human body.

MATERIALS & METHODS

The present study comprised of 80subjectsof both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. 2 groups were formed. Group I were on regular yoga and group II had healthy subjects who do not practice yoga (control). Anthropometric measurements like height, weight was taken. BMI was calculated, and recordings of AFT were done in the morning.Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of subjects

Group	Group I	Group II
Status	Yoga	Control
M:F	22:18	20:20

Table I shows that group I had 22 males and 18 females and group II had 20 males and 20 females.

Table II Anthropometry data

Parameters	Group I	Group II	P value
Age (years)	18.6	20.4	0.91
Height (cm)	164.2	165.3	0.94
Weight (Kgs)	53.2	57.5	0.82
BMI (Kg/cm2)	20.1	21.3	0.71

Table II, graph I shows that mean age of group I was 18.6 years and in group II was 20.4 years. The mean height was 164.2 cm in group I and 165.3 cm in group II. The mean weight

was 53.2 Kgs in group I and 57.5 Kgs in group II. The mean BMI was 20.1 Kg/cm2 in group I and 21.3 Kg/cm2 in group II. The difference was non- significant (P>0.05).

Table III Comparison of autonomic function test

Parameters	Group I	Group II	P value
Resting HR (bpm)	80.3	69.4	0.05
DBT (bpm)	1.43	1.72	0.82
30:15 ratio (bpm)	1.12	1.26	0.91
VR (bpm)	1.52	1.81	0.74
HGT (mmHg)	16.8	10.2	0.01
BP response toStanding (mmHg)	6.32	8.43	0.09

Table III, graph I shows that resting HR (bpm) was 80.3 and 69.4, DBT (bpm) was 1.43 and 1.72, 30:15 ratio (bpm) was 1.12 and 1.26, VR (bpm) was 1.52 and 1.81, HGT (mm Hg) was 16.8 and 10.2 and BP response to standing (mm Hg) was 6.32 and 8.43 in group I and II respectively. The difference was non- significant (P>0.05).

DISCUSSION

Cardiovascular disease is the leading cause of death for both men and women.[6] Lifestyle modifications are important factors in the treatment, prevention, and rehabilitation of cardiovascular disorders.[7,8]Yoga is one of the best lifestyle modifications and an ancient *vedic* science thought to have originated in India in 5000 BC which is being applied in the field of therapeutics. It includes practice of specific posture (*āsana*), regulated breathing (*Prāṇāyāma)* etc., Breath is the dynamic bridge between body and mind and *Prāṇāyāma* is one of the most important yogic practices.[9]The present study was conducted to assess effect of yoga on autonomic nervous system of human body.

We found that group I had 22 males and 18 females and group II had 20 males and 20 females.Shobana et al[10]compared the autonomic functions among yoga practitioners and nonyoga practitioners. The autonomic reactivity tests like resting heart rate, response of heart rate to standing, Valsalva maneuver, and response of heart rate to deep breathing, response of BP to standing, and sustained hand-grip were done. In the autonomic reactivity test, resting heart rate (80.92 ± 11.76 vs 69.24 ± 10.64) and sustained handgrip (16.30 ± 4.53 vs 10.20 ± 3.67) significantly decreased (P < 0.05) in the participants of the yoga group compared to control group. Deep breathing test, Valsalva maneuver, 30:15 ratio in lying to standing, and BP response to standing test did not show any significant difference between the groups (P > 0.05).

We found that mean age of group I was 18.6 years and in group II was 20.4 years. The mean height was 164.2 cm in group I and 165.3 cm in group II. The mean weight was 53.2 Kgs in group I and 57.5 Kgs in group II. The mean BMI was 20.1 Kg/cm2 in group I and 21.3 Kg/cm2 in group II. Frank et al[11]evaluated the potential effects of yoga on autonomic regulation in young adults by analyzing heart rate variability (HRV).Fourteen healthy young adults took part in a 10-week yoga program (90 min once a week) in school and were compared to a control group of 11 students who participated in conventional school sports (90 min once a week over 10 weeks). 24-hour electrocardiograms (ECGs) were recorded at baseline and following the 10-week intervention. From 20-minute of nocturnal sleep phases,

HRV parameters were calculated from linear (time and frequency domain) and nonlinear dynamics. The statistical analysis of the interaction effects did not reveal a significant group and time interaction for the individual nocturnal HRV indices. Almost all indices revealed medium and large effects regarding the time main effects. The changes in the HRV indices following the intervention were more dramatic for the yoga group than for the control group which is reflected in predominantly higher significances and stronger effect sizes in the yoga group.

We observed that resting HR (bpm) was 80.3 and 69.4, DBT (bpm) was 1.43 and 1.72, 30:15 ratio (bpm) was 1.12 and 1.26, VR (bpm) was 1.52 and 1.81, HGT (mm Hg) was 16.8 and 10.2 and BP response to standing (mm Hg)was 6.32 and 8.43 in group I and II respectively. Activation of the sympathetic nervous system exists under conditions of strain due to either physical or mental cause.[12] Handgrip exercise is also noted to raise blood pressure and heart rate. Yoga practice triggers activation of the parasympathetic system and declines the activity of the sympathetic nervous system, these may be likely reasons for less increase in BP in yoga practitioners with Handgrip test.

The limitation the study is small sample size.

CONCLUSION

Authors found that regular long-term yoga training showed significant effects which streamline autonomic functions that help to prevent lifestyle diseases and their complications.

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