STUDY OF STRESS-RELATED DISEASES IN YOGA AND OTHER FORM OF EXERCISE PRACTITIONERS

Megha P. Tajne¹, Heena D. Pahuja², Anjali R. Bhure³, Savita M. Chauhan⁴, Medhana Lokhande⁵, Nagesh Malbhage⁶, Sayali Kulkarni⁷, Neha Fuladi⁸

¹Associate Professor, Department of Anaesthesia, NKP Salve Institute of Medical Sciences, Nagpur.

²Assistant Professor, Department of Anaesthesia, NKP Salve Institute of Medical Sciences, Nagpur.

³Professor and HOD, Department of Anaesthesia, NKP Salve Institute of Medical Sciences, Nagpur.

⁴Assistant Lecturer, Department of Anaesthesia, NKP Salve Institute of Medical Sciences, Nagpur.

⁵Assistant Professor, Department of Anaesthesia, NKP Salve Institute of Medical Sciences, Nagpur.

⁶Junior Resident, NKP Salve Institute of Medical Sciences, Nagpur.

⁷Junior Resident, NKP Salve Institute of Medical Sciences, Nagpur.

⁸Junior Resident, NKP Salve Institute of Medical Sciences, Nagpur.

ABSTRACT

BACKGROUND

Physical exercise is any bodily activity that enhances or maintains physical fitness and overall health. It is performed for various reasons, such as increasing growth and development, preventing ageing, strengthening muscles and the cardiovascular system, increasing athletic skills, weight loss or maintenance, and also enjoyment. There are various types of exercises such as aerobic, anaerobic, yoga, etc.

Our study aims to compare yoga and other form of exercise and its effects on stress-related diseases.

MATERIALS AND METHODS

Our study was a cross-sectional, retrospective, questionnaire-based study. 134 subjects belonged to yoga group [group Y] and 82 were in the other form of exercise group [group E]. Incidence of stress-related diseases such as Hypertension [HT], Ischaemic heart disease [IHD], Diabetes mellitus [DM], Asthma, Chronic back pain [CBP], Osteoarthritis, and Headache were found out in the two groups.

RESULTS

In yoga group, hypertensives were higher than in other exercise group. But, the subjects of IHD, DM, Asthma, chronic back pain, osteoarthritis and headache were higher in other exercise group when compared to yoga group. This difference was not statistically significant.

CONCLUSION

In our study, beneficial effects of yoga and other form of exercises are comparable with yoga group showing slight superior result.

KEYWORDS

Yoga, Physical Inactivity, Exercise, Stress, Diseases, Health Benefits of Yoga.

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BACKGROUND

When challenged with any physical task the human body responds through a series of integrated changes in function that involve various systems. Movement requires activation and control of the musculoskeletal system; the cardiovascular, respiratory system, etc. When the body engages in exercise training, systems undergo specific adaptations that increase the body's efficacy and capacity.

Physical inactivity is a modifiable risk factor for cardiovascular disease and a widening variety of other chronic diseases including diabetes mellitus, cancer, hypertension, obesity, bone and joint diseases (osteoporosis and osteoarthritis), and depression. There is irrefutable evidence of the effectiveness of regular physical activity in

the primary and secondary prevention of several chronic diseases. There appears to be a linear relation between physical activity and health status, such that a further increase in physical activity and fitness will lead to additional improvement in health status.¹

Yoga is an ancient discipline designed to bring balance and health to the physical, mental, emotional, and spiritual dimensions of the individual. Yoga is often depicted metaphorically as a tree and comprises eight aspects, limbs: yama [universal ethics], niyama [individual ethics], asana [physical postures], pranayama [breath control], pratyahara [control of the senses], dharana [concentration], dhyana [meditation], and Samadhi [bliss]. A growing body of evidence supports the belief that yoga benefits physical and mental health via downregulation of the hypothalamic-pituitary-adrenal [HPA] axis and the sympathetic nervous system [SNS].² Research on yoga is rapidly proliferating, researchers are studying the effects of yoga on a wide range of mental and physical conditions. Researchers have demonstrated preliminary efficacy for many conditions including, arthritis, stress, metabolic syndrome, asthma, pain and depression.³ However, the literature is replete with many contradictory findings and generally characterised as

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Corresponding Author:

Dr. Heena D. Pahuja,

C-302, Pritam Complex,

Old Bhandara Road, Nagpur.

E-mail: heenapahuja15@yahoo.com

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inconclusive. The purpose of this article is to study the impact of yoga compared to other form of exercise on a variety of stress-related diseases such as HT, IHD, DM, Asthma, CBP, Osteoarthritis and Headache.

MATERIALS AND METHODS

The present study was conducted in a tertiary centre after taking approval of institutional ethics committee.

Study Design

It was a cross-sectional retrospective study.

Data was collected from 216 subjects from the general population who had HT, IHD, DM, Asthma, CBP, Osteoarthritis and Headache since last 10 years and were practising yoga or other form of exercise since last 5 years. They were on their regular medical drugs since last 10 years. They practised yoga like [asanas, pranayama] or any other form of exercise like [physical training, cycling, jogging, walking, running, swimming, aerobics, dancing, any sports] etc. 134 subjects turned out to be yoga practitioners [group Y] and 82 were practising other form of exercise [group E]. It was a questionnaire-based study. Incidence of stress-related diseases [hypertension, ischaemic heart disease, diabetes mellitus, asthma, chronic back pain, headache] were studied in both the groups.

Statistical Analysis

The data was collected and compiled using Epi Info Version 7.2. The quantitative variables were expressed in terms of mean and standard deviation and the qualitative variables were expressed in terms of mean and standard in proportions. Chi square test/Fisher's exact test has been used to find the difference between two proportions.

RESULTS

Age Groups (Years)	Group Y		Group E		P value
	Number	%	Number	%	
40-50	56	69.30	82	61.20	0.2918
51-60	26	30.70	52	38.80	
Total	82	100	134	100	

Table 1. Age Groups

Chi square test applied.

Table 1 shows the distribution of the study subjects based on age groups. In yoga group, the majority of study subjects were in the age group of 40 to 50 years followed by 50 to 60 years. In other exercise group also, majority of study subjects were in the age group of 40-50 years followed by 50-60 years.

Gender	Group Y		Group E		P value
	Number	%	Number	%	
Male	47	57.31	59	44.02	0.0580
Female	35	42.68	75	55.97	
Total	82	100	134	100	

Table 2. Gender

Table 2 shows the gender wise distribution of the study subjects. The yoga group had majority of males, and the other exercise group had majority of females. But this difference was not statistically significant.

Disease	Group Y		Group E		P value
	n	%	n	%	
Hypertension	19	23.17	23	17.16	0.2790
Ischaemic heart disease	2	2.43	5	3.73	0.7117
Diabetes mellitus	5	6.09	9	6.71	0.8577
Asthma	2	2.43	5	3.73	0.5896
Chronic low back pain	6	7.31	17	12.6	0.2143
Osteoarthritis	5	6.09	11	8.20	0.5652
Headache	4	4.8	9	6.7	0.5814

Table 3

Table 3 shows the proportion of the study subjects with morbidities. In yoga group, hypertensives were higher than in other exercise group. But, the cases of IHD, DM, Asthma, chronic back pain, osteoarthritis and headache were higher in other exercise group when compared to yoga group. This difference was not statistically significant.

DISCUSSION

In research involving the health benefits of yoga and other form of exercise, exercise is the single most common intervention used as a comparison.

Ischaemic heart disease is on the increase nowadays. There are a number of risk factors associated with it. Heart rate variability [HRV] has been established as a non-invasive tool to study cardiac autonomic activity. Reduced HRV has been established as a predictor for increased risk of cardiac mortality and sudden cardiac death especially in patients after myocardial infarction.

In an interesting study, Khattab et al used 24-hour Holter monitoring to compare HRV during a 60 min. yoga practice versus 60 min. of park walking. They found out that the yoga practitioners exhibited greater HRV, particularly in those measures associated with parasympathetic tone, than during walking [$p < 0.001$].⁴ Manchanda S C et al found out that yoga lifestyle intervention retards progression and increases regression of coronary atherosclerosis in patients with severe coronary artery disease. It also improves symptomatic status, functional class and risk factor profile.⁵ Vinay AV et al concluded that autonomic balance tilts towards parasympathetic predominance after 1 month of yoga practice.⁶ Central arterial stiffness is an accepted risk factor for cardiovascular disease. Courtney M Duren et al tried to evaluate arterial stiffness in middle aged adults who regularly practised yoga, performed regular exercise, or were inactive. Yoga and aerobic groups were not different in either carotid artery distensibility (DC) ($p=0.26$) or pulse wave velocity (PWV) ($p=0.21$). The sedentary group had lower DC and higher PWV compared to the aerobic and yoga groups (both $p < 0.001$).⁷ In our study, we found out that the subjects who had Ischaemic heart disease was 3.73% in other form of exercise practitioners [group E] while in yoga practitioners [group Y] it was 2.43%. P value was 0.7117 which was not statistically significant.

Bowman A J et al studied the effects of aerobic exercise training and yoga on the baroreflex in healthy elderly persons. They found out that Heart rate decreased following yoga $P < 0.05$ but not aerobic training $P = 0.29$. VO_2 max increased by 11% following yoga ($P < 0.01$) and by 24% following aerobic training ($P < 0.01$). No significant change in alpha MF ($P = 0.69$) or alpha HF ($P = 0.65$) occurred after

aerobic training. Following yoga, alpha HF $P < 0.01$ but no increase in alpha MF $P = 0.29$.

They found out that short duration aerobic training does not modify the alpha – index at alpha MF [sympathetic activity] or alpha HF [parasympathetic activity]. Alpha HF but not alpha MF increased following yoga, suggesting that these parameters are measuring distinct aspects of the baroreflex that are separately modifiable.⁸ W Selvamurthy et al demonstrated that the sluggish baroreflex mechanism observed in patients of essential hypertension can be reactivated by a 3-week course of orthostatic tilt or selected yogic postural exercises thereby restoring BP to normal levels. Once the sensitivity of baroreceptor mechanism is restored, it corrects all other neurohumoral malfunctioning, as observed from the reduction in sympathetic activity, plasma catecholamines, renin activity to optimal level after 3 weeks of tilt or yoga course. It also points to a close link between the baroreceptor mechanism, sympathetic activity and renin mechanisms suggesting an unifying role of baroreceptor mechanism in the aetiology of essential hypertension.⁹ Damodaran A et al studied the effect of yoga on the physiological, psychological wellbeing, psychomotor parameter and modifying cardiovascular risk factors in mild-to-moderate hypertensive patients. Results showed decrease in BP and drug score modifying risk factors, i.e. blood glucose, cholesterol and triglycerides decrease in VMA [Vanillylmandelic acid], catecholamine, and decreased MDA [malondialdehyde] level suggestive of decrease sympathetic activity and oxidant stress.¹⁰ McCaffrey et al tried to determine the effectiveness of a yoga program on blood pressure and stress, a group of hypertensive patients in Thailand were studied, with the experimental group showing significantly decreased mean stress scores and blood pressure, heart rate, and body mass index levels compared with the control group.¹¹ In our study, the percentage of hypertension in other form of exercise group was 17.16 while in yoga group it was 23.17, p value was 0.2790. The difference between the two groups was not statistically significant. Our findings are consistent with the above authors in view of hypertension.

Lorenzo A Gordon et al studied the effect of exercise therapy on lipid profile and oxidative stress indicators in patients with type 2 diabetes and demonstrated the efficacy of Hatha yoga on fasting blood glucose, lipid profile, oxidative stress markers and antioxidant status in patients with type 2 diabetes and suggested that hatha yoga exercise and conventional PT exercise may have therapeutic preventive and protective effects on diabetes mellitus by decreasing oxidative stress and improving antioxidant status.¹² Praveen Angadi et al studied adherence to yoga and its resultant effects on blood glucose in type 2 diabetes and demonstrated that participants who completed the yoga program had significantly lower HbA_{1c} (end of 3rd month). At the end of 6 months, yoga adherence was significantly negatively correlated with blood sugar and stress.¹³ Heath GW et al studied the effects of exercise and lack of exercise on glucose tolerance and insulin sensitivity and demonstrated that physically trained individuals have a markedly blunted insulin response to a glucose load and yet have normal glucose tolerance. This phenomenon has generally been ascribed to longterm adaptations to training which correlate with maximal oxygen uptake (VO₂ max) and reduced

adiposity. Despite the increased insulin levels, blood glucose concentrations were higher after 10 days without exercise. Insulin binding to monocytes also decreased with physical inactivity. One bout of exercise after 11 days without exercise returned insulin binding and the insulin and glucose responses to an oral 100-gram glucose load almost to the initial “trained” value.¹⁴ In our study, 6.09% subjects in group Y had DM while it was 6.71% in group E. P value was 0.877 which was statistically not significant. Our findings are consistent with the above authors with regards to DM.

Tarun Saxena et al studied the effect of various breathing exercises (pranayama) in patients with bronchial asthma of mild-to-moderate severity and demonstrated that after 12 weeks the pranayama group subjects had significant improvement in symptoms, FEV₁ and PEF as compared to meditation group subjects. Breathing exercises (pranayama), mainly expiratory exercises, improved lung function subjectively and objectively and should be regular part of therapy. Three important things were found in their study. Firstly, expiratory exercises are helpful. In bronchial asthma expiration is difficult, so exercises that support expiration are beneficial and secondly, forceful expiratory exercises are helpful. air easily comes in and goes out in a normal person, but in an asthmatic patient air is coming in easily but during expiration there is closing of airways and force is required to open the airways; hence, a high pitch/forceful Omkara 000000000.....MMM was found to be helpful instead of 0000..mmm. Thirdly, prolonged expiratory exercises (expiration) are helpful. During normal Omkara the air comes out only from the upper part of the airways, but asthma is a disease that affects whole lower respiratory tract, so prolonged exercise which helps to expire maximum trapped air is found beneficial. Normally, Omkara is stopped after 10-15 seconds like 00000.....mmm, but the beneficial effect in asthma is found with prolonged 00000000000000.....MMMM until further expiration is not possible.¹⁵ Agnihotri S et al studied the impact of yoga on biochemical profile of asthmatics: A randomised controlled study. They demonstrated that in yoga group, there was significant improvement found in the proportion of haemoglobin and antioxidant superoxide dismutase in comparison to control group and significant decrease was found in total leukocyte count (TLC) and differential leukocyte count in comparison to control group.¹⁶ In our study, we found out that the percentage of asthmatics in other form of exercise group was 3.73% while in yoga practitioners it was 2.43%. The p value was 0.5896 which was not significant amongst the two groups. Our findings are correlating with the above authors.

Karen J. Sherman et al studied whether yoga is more effective than conventional stretching exercises or a self-care book for primary care patients with chronic low back pain. They found out that yoga classes were more effective than a self-care book, but not more effective than stretching classes, in improving function and reducing symptoms due to chronic low back pain, with benefits lasting several months.¹⁷ Galantino ML et al studied the impact of modified hatha yoga on chronic low back pain: a pilot study and demonstrated that potentially important trends in the functional measurement scores showed improved balance and flexibility and decreased disability and depression for the yoga group

but this pilot was not powered to reach statistical significance.¹⁸

In our study, the percentage was 12.6 in group E while it was 7.31% in group Y in subjects of chronic low backache. P value was 0.2143 which was statistically not significant.

John Ebenezer et al in his study concluded that an integrated approach of yoga therapy is better than therapeutic exercises as an adjunct to transcutaneous electrical stimulation and ultrasound treatment in improving knee disability and quality of life in patients with osteoarthritis knees.¹⁹ Zainab S Motorwala et al studied the effects of yogasanas on osteoporosis in postmenopausal women and demonstrated that a statistically significant difference was found in the Bone mineral density (BMD) score. Thus, they concluded that integrated yoga is a safe mode of physical activity which includes weightbearing as well as non-weightbearing asanas, pranayama, and suryanamaskar, all of which helps induce improvement in BMD in postmenopausal osteoporotic females.²⁰ In our study, the percentage was 8.20 in group E and 6.09 in group Y in arthritis subjects. P value was 0.5652 which was statistically not significant.

John P J et al studied the effectiveness of yoga therapy in the treatment of migraine without aura. They concluded that there was a significant reduction in migraine headache frequency and associated clinical features, in patients treated with yoga over a period of 3 months.²¹ In our study, 6.7% in group E had headache while it was 4.8% in group Y. P value was 0.5814 which was statistically not significant.

Mental stress is on the increase day by day. West J et al studied the effect of hatha yoga and African dance on perceived stress, affect and salivary cortisol. Both African dance and hatha yoga reduced perceived stress and negative affect. Cortisol increased in African dance group and decreased in hatha yoga group. Therefore, even when these interventions produce similar positive psychological effects, the effects may be very different on physiological stress processes.²² Sushil Chandra et al studied mental stress its neurophysiology and its regulation by Sudarshan kriya yoga (SKY). The EEG, ECG and stress determination stress showed significant decrement in mental stress and improvement in cognitive performance after SKY, indicating SKY as a good alternative of medication for stress management.²³ Harber VJ et al in their article reviewed that the serum concentration of endogenous opioids, in particular beta-endorphin and beta-lipotropin, increase in response to both acute exercise and training programs. They cause immediate mood elevation and altered perception of pain. Endogenous opioids depress ventilation and may therefore play a role in ventilatory regulation by CO₂, hypoxia and exercise. The yoga postures are slow rhythmic movements which emphasise the stimulation of the organs and glands by easy bending and extensions which do not overstimulate muscles but concentrate on glandular stimulation.²⁴

Overall exercise helps to prevent depression, increase quality of sleep and act as a non-pharmaceutical sleep aid to treat diseases such as insomnia, improve mental health, maintain steady digestion and treat constipation, and augment an individual's body image for maintaining positive self-esteem.

CONCLUSION

In our study, beneficial effects of yoga and other form of exercise are comparable, with yoga group showing slight superior result. When one compares longterm yoga practitioners to people practising other form of exercise, better body awareness is observed in yoga practitioners. There are various incidences of harm caused to the body in both yoga and other form of exercise in intense and vigorous practitioners. So, taking this into consideration, the tailoring of whatever form of exercise practised should be according to the limitation of the body and its requirement.

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