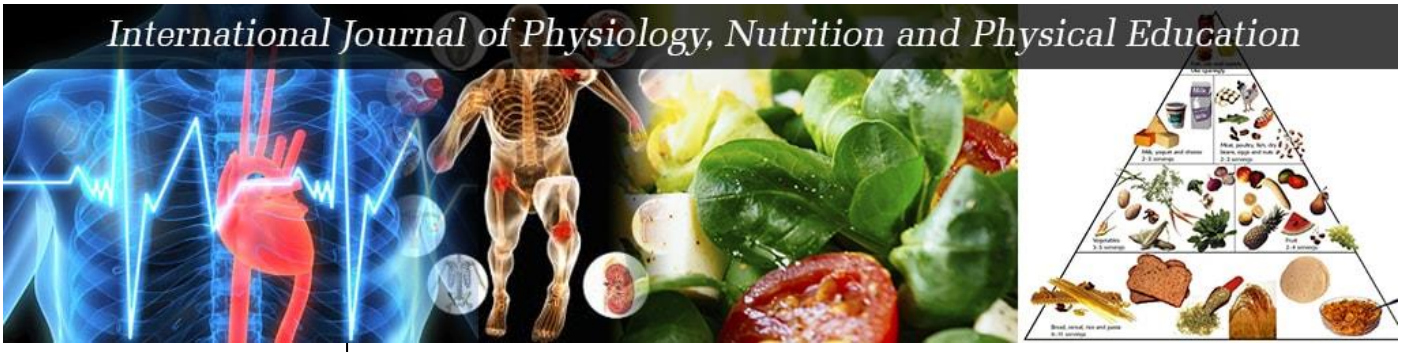

ISSN: 2456-0057
IJPNPE 2019; 4(1): 2125-2127

www.journalofsports.com
Received: 10-11-2018
Accepted: 14-12-2018

Nimai Chand Masanta
Associate Professor, Officer-in-Charge Mohanpur Govt. College, West Bengal, India

Correspondence
Nimai Chand Masanta
Associate Professor, Officer-in-Charge Mohanpur Govt. College, West Bengal, India

Effect of 12-week yogic practices on middle aged hypertension patients

Nimai Chand Masanta

Abstract
The aim of the study was to assess the effects of 12-week selected yogic exercises on middle aged hypertension patients. Twenty eight (28) purposively selected male high blood pressure patients from Midnapore town (Paschim Medinipur), West Bengal, aged 42–54 years were volunteered to participate in this study. Subjects were assigned into two groups: Experimental group (N=14) and Control group (N=14). The subjects from Experimental group were subjected to practices 12-week of yogic exercises which included six Asanas and three Pranayamas. The Experimental group was practiced 12-week selected yogic exercises for an hour and fifteen minutes with six days per week. Both systolic and diastolic blood pressures were measured with the auscultatory method by using sphygmomanometer and stethoscope. The between-group differences were assessed using the Independent Sample 't'-test for dependent data. The level of $p< 0.05$ was considered significant. The systolic and diastolic blood pressures were significantly reduced in Experimental Group when compared with the Control one. The yogic exercises programme may be recommended to control high blood pressure and may also contribute to enhance health status and wellness of hypertension patients.

Keywords: Yogic practices, middle aged, hypertension patients, systolic and diastolic blood pressure

Introduction
Yoga is a systematic process for an all-round personality development of physical mental, intellectual, emotional and spiritual level. The ultimate aim of yoga is to get liberation. It is a living experience of the knowledge of the Vedas. Nowadays yoga is becoming more and more popular. It attracts the attention of the whole world. Gradually, yoga is becoming a lifestyle, almost a fashion of the modern world. People adopted yoga as tool keep the body and mind fit, to cure diseases by improving the functions of vital organs of the body. Yoga is practiced for peace of mind and also to improve beauty. Yoga is called a skill full trick to calm down the mind. Yoga is discipline; a disciplined mind and disciplined body is the main achievement of yoga. It offers us a conscious process to solve such problems as depression, unhappiness, restlessness, emotional conflicts, hyperactivity etc. It helps to evolve the hidden potentialities of human beings in a systematic and scientific way so that the human being can improve intellectually it makes the mind and the body so disciplined that one can effectively face the challenges of the modern technological era with its hectic speed and live happily without frustrations.

Asana and pranayama have been incorporated alongside Ayurvedic medicine as the basis of a system of medical therapy. Hatha Yoga has become increasingly popular in western countries as a method for coping with stress and as a means of exercise and fitness training (Schell *et al*., 1994) [12]. Yoga has been practiced for thousands of years. It is based on ancient theories, observations and principles of the mind-body connections. Substantial research has been conducted to look at the health benefits of yoga - yoga postures (asanas), yoga breathing (pranayama) and meditation. These yoga practices might be interacting with various somatic and neuro-endocrine mechanisms bringing about therapeutic effects (Malhotra & Singh, 2002) [9]. Yoga practices can also be used as psycho-physiological stimuli to increase the secretion of melatonin which, in turn, might be responsible for perceived well-being (Harinath *et al*., 2004) [6]. Yoga may be as effective as or better than exercise at improving a variety of health related outcome measures (Ross & Thomas, 2010) [11].

Modern man is the victim of stress and stress related disorders which threaten to disrupt life totally. With increased awareness and interest in health and natural remedies, breathing techniques are gaining importance and becoming increasingly acceptable to the scientific community. Yogic techniques are known to improve one's overall performance and work capacity. Yoga appears to provide a comparable improvement in stress, anxiety and health status. Yogic practices can be used as psycho-physiologic stimuli to increase endogenous secretion of melatonin, which in turn, might be responsible for improved sense of well-being (Harinath *et al*., 2004) [6].

The relationship between hypertension and cardiovascular disease is well established (Hajjar & Kotchen, 2003) [5]. The occurrence of hypertension in the United States is increasing despite increased wakefulness of the importance of controlling blood pressure. Antihypertensive treatment is very important to prevent major cardiovascular complications such as stroke, congestive heart failure, coronary artery disease, and cardiac hypertrophy. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure guidelines recommend early intervention for pre-hypertension (Chobanian *et al*., 2010) [3]. Interventions to control blood pressure include lifestyle modification and antihypertensive drug therapy and as a result this study was undertaken to find out the impact of selected yogic exercises on middle aged hypertension patients.

Material and Methods

Subjects: Twenty eight (28) purposively selected middle aged male high blood pressure patients from Midnapore town (Paschim Medinipur), West Bengal, aged 42–54 years were volunteered to participate in this study. Subjects were assigned into two groups: Experimental group (N=14) and Control group (N=14). The subjects were explained about the procedure and importance of the study. The subjects from Experimental group were subjected to a 12-week yogic exercises training programme. This lasted 12- weeks and consisted of daily sessions, lasting one hour and fifteen minutes each, which included 6-Asanas: Padmasana, Siddhasana, Sukhasana, Paschim Utthanasana, Vajrasana and Ushtrasana and 3- Pranayama: Anuloma Viloma, Kapalbhati and Bhramari. The six days in a week was observed in practice of Yogic exercises and Sunday was considered as rest day. Both systolic and diastolic blood pressures were measured with the auscultatory method by using sphygmomanometer and stethoscope. All patients were taking high blood pressure medicine as prescribed by their respective doctors. Two readings were taken with interval of five minutes and their average was recorded.

Statistical analysis: For the purpose of analysis of data descriptive statistics the Mean, Standard Deviation and Mean Difference were obtained through the software of SPSS, Version 20. To check the difference of mean scores between pre-test and post-test of experimental and control groups the Independent Sample t-test were applied. The level of significance was set at 0.05.

Results

The research that was conducted aimed to determine the impact of selected yogic exercises on middle age hypertension patients. Table 1 shows the Mean value (±SD), Mean difference and Independent Sample t-test of systolic and diastolic blood pressure of experimental and control groups (N=14 each) before (Pre) and after (Post) 12-week selected yogic exercises (Experimental group only).

Table 1: Mean, Standard Deviation, Mean Difference and Independent Sample t-test of Pre-test and Post-test scores of Experimental and Control groups on Systolic and Diastolic Blood pressure

Selected Parameter	Group	Pre-Test (N=14)	Post-Test (N=14)	M.D.	t- value	p- value
Systolic Blood Pressure (mm. Hg.)	Experimental	147.8±9.42	144.5±8.47	3.30	2.93	0.03*
	Control	148.3±9.04	147.5±8.14	0.80	0.53	0.64
Diastolic Blood Pressure (mm. Hg.)	Experimental	94.96±5.22	92.32±4.54	2.64	2.38	0.01*
	Control	95.04±5.19	94.83±5.12	0.21	0.42	0.67

*Significant at 0.05 level. *Tabulated value of $t_{.05}$ (13) = 2.16

The Mean and Standard Deviation (±SD) values of systolic blood pressure of pre-test and post-test of experimental group were 147.8±9.42 and 144.5±8.47 respectively. However, the Mean and Standard Deviation (±SD) values of systolic blood pressure of pre-test and post-test of control group were 148.3±9.04 and 147.5±8.14. The t-value in case of experimental and control groups were 2.93 and 0.53 respectively. Significant between-group differences were noted in systolic blood pressure in favour of experimental group before (Pre) and after (Post) subjected to practices of 12-week yogic exercises since, the calculated value of (t=2.93) is greater than tabulated value of $t_{.05}$ (13) = 2.16 for the selected degree of freedom and level of significance. However, no significant changes occurred over the 12-week period in the control group.

The Mean and Standard Deviation (±SD) values of diastolic blood pressure of pre-test and post-test of experimental group were 94.96±5.22 and 92.32±4.54 respectively. However, the Mean and Standard Deviation (±SD) values of diastolic blood pressure of pre-test and post-test of control group were 95.04±5.19 and 94.83±5.12 respectively. The t-value in case of experimental group was 2.38 and for control group it was 0.42. Significant between-group differences were noted in diastolic blood pressure in the experimental group before (Pre) and after (Post) subjected to practices 12-week yogic exercises since, the calculated value of (t=2.38) is greater than tabulated value of $t_{.05}$ (13) = 2.16 for the selected degree of freedom and level of significance. However, no significant changes occurred over 12-week period in the control group.

Discussion

Yoga practices are known to significantly improve health status, reduce stress and anxiety as well as cardiovascular diseases. Since yoga aims at perfection of the body and mind, it is natural to ask whether the progress towards perfection is reflected in objective reproducible changes in physiological variables. The prevention, detection and control of blood pressure (BP) through yogic practice should be the main concern in this study for preventing cardiovascular disease (Roest, *et al*., 2010) [10]. The mean values of systolic and diastolic blood pressure are highly significant reduction after 12-week of yogic practice on middle aged hypertension

patients. Blood pressure related with cardiovascular system is controlled by autonomic nervous system. Reduction in blood pressure indicates a shift in the balancing components of autonomic nervous system towards the parasympathetic activity which was reported by Joseph *et al*., (1981) [7] and Anand, (1991) [1]. This modulation of autonomic nervous system activity might have been brought about through the conditioning effect of yoga on autonomic functions and mediated through the limbic system and higher areas of central nervous system was reported by Selvamurthy *et al*., (1983) [13]. Regular practice of yoga increases the baroreflex sensitivity and decreases the sympathetic tone; thereby restoring blood pressure to normal level in patients of essential hypertension was reported by Vijaya Lakshmi *et al*., (2004) [14]. A significant decline in systolic blood pressure in the present study is in accordance with the findings of Bhargava *et al*. (1988) [2]. Diastolic blood pressure mainly varies with the degree of peripheral resistance (Guyton, 1996) [4] and heart rate. The significant change in diastolic blood pressure observed in the present study suggests that Yogic exercises might have any immediate effect on peripheral vascular resistance and to reduce heart rate. The findings of this study also supported by (Joshi *et al*., 1992) [8] who suggest that yogic asanas and pranayama have been shown to reduce the physiological parameters Result of this study also supported by (Joshi *et al*., 1992) [8]. This may suggest that yoga is more effective in reducing the basal heart rate and blood pressure in morbid conditions like obesity.

Conclusion

Based on the analysis of the results obtained, we concluded that the significant differences were found in systolic and diastolic blood pressure as a result of 12-week yogic exercise treatment. Insignificant difference between pre and post test of control group was observed. In conclusion, the present study suggests that 12-week of yogic exercise training had significant effect on systolic and diastolic blood pressure. These data provide more evidence to support the beneficial effect of yogic asana and pranayama exercises reducing blood pressure. It may be recommended from the findings that yogic exercises decrease the risk of diseases directly or indirectly by promoting better health and wellness.

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