



EFFECT OF SUDARSHAN KRIYA YOGA (COMPREHENSIVE YOGIC BREATHING) ON BLOOD PRESSURE & PULSE RATE IN HYPERTENSIVE SUBJECTS.

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ABSTRACT **Background:** Yoga & pranayam has been proven to be beneficial in hypertension. The aim of this study was to observe effects of Sudarshan Kriya Yoga on Blood pressure & Pulse rate in Hypertensive subjects.
Materials & Methods: This prospective study was done at two Art of Living centers from april to September 2016. Blood pressure and pulse rate were measured along with other preliminary information in 117 subjects. 36 subjects found to be hypertensive. They were trained to practice sudarshan kriya Yoga (SKY) by certified art of living teachers and asked to regularly practice it at home. B.P. and pulse rate of participants were measured again at the end of 4 months. Mean, standard deviation & paired T test were done for analysis of results.
Results: SBP, DBP & pulse rate were significantly reduced after 4 month practice of SKY.
Conclusion: comprehensive yogic breathing is beneficial in lowering blood pressure and pulse rate in hypertensive patients.

KEYWORDS : Sudarshan Kriya Yoga (SKY), Hypertension

Introduction:

Essential Hypertension is commonest type (90%) of Hypertension. Stress full lifestyle has been proved to be its important causative factor .Yoga & pranayam , when performed with conscious mind, can reduce this type of stress-induced hypertension, while addressing its underlying causes. Several studies have proved beneficial effects of different forms of yoga and pranayam techniques in hypertension.

Sudarshan Kriya Yoga (SKY) is special rhythmic breathing technique designed by shri shri Ravishankar , the founder of the Art of Living organization. Many studies have suggested beneficial effects of SKY in improving immunity and antioxidant mechanisms of body, better control of blood sugar and lipid levels, improvement of respiratory functions, relieving psychiatric illness like depression, anxiety and in auxillary management of hypertension. SKY creates a balance in autonomic nervous system. It pacifies sympathetic nervous system and produce parasympathetic dominance thus helps in lowering SBP, DBP and pulse rate (PR). So it may be helpful as a complementary therapy in management of hypertension.

In view of above consideration, the present study was an attempt to see effect of sudarshan kriya Yoga on blood pressure and heart rate.

Materials & Methods :

This prospective study was done at two centers of Art of living program , located in Vasant Vihar colony & vijayapuram colony of bilaspur , c.g. from april to september 2016 .Total 160 subjects were screened through six art of living courses held in the two centers. All basic information like age, sex, history of hypertension or diabetes was noted for all the participants. Pulse rate, systolic and diastolic blood pressure was measured.

Subjects with known history of hypertension who were on antihypertensive medication, as well as newly diagnosed hypertensive subjects were included in the study.

Subjects with known history of kidney disease, pregnancy and those who were below 30 yrs of age excluded from study. Informed & written consent was taken from all the participants.

31 subjects were below 30 yr of age, 2 subjects had kidney disease & 10 subjects did not consent for the study. Blood pressure & pulse rate was measured for remaining 117 subjects. Subjects were made to be seated comfortably for at least 5 minutes with arm supported at heart level. Radial pulse was counted for complete on minute. Blood pressure was recorded by properly validated & calibrated sphygmomanometer. Two readings were taken at interval of 15 min & average was taken , if they differ by more than 5mm hg , one more reading was taken & then averaged . Before measuring the B.P. the subject were questioned about drinking tea or coffee, smoking, physical activity & a full bladder. Hypertension was defined as SBP \geq

140 mm Hg and or DBP \geq 90 mm Hg as per recommendation of 8th report of JNC.

36 subjects out of 117, were hypertensive. Participants were trained to exercise SKY by certified teachers of art of living course, which included yogic movements, asana, relaxation practices, meditation & group processes. On first two days subject underwent 1 hr of long group breathing technique which included three stages of pranayam, three rounds of Bhastrika (20 each), OM chanting for three times followed by guided long Sudarshan kriya & then rest in supine position. On third day they were trained to practice short sudarshan kriya, which included three stages of Pranayam, three rounds (20 each) of Bhastrika, three times OM chanting, short sudarshan kriya followed by rest in supine position. Short kriya process took total of 25 -35 min. Subjects were asked to regularly practice SKY at home & fill a follow up book in which they marked days on which they did SKY at home .They were instructed to come for follow up for practicing long sudarshan kriya on fixed days (once in a week) in their respective centers . Daily practice of SKY at home is ensured by checking their follow up books on the day of follow up. Compliance was defined as no. of short kriya \geq 40 (33 % of total short kriyas) + no. of long kriya \geq 4 (25 % of long kriyas) .¹

6 subjects failed to fulfill criterion of compliance of the study & excluded. So only 30 subjects were included in the study for analysis. 8 out of 30 hypertensive subjects were known case of hypertension and were already on antihypertensive medication. Remaining 22 subjects were diagnosed as hypertensive by recording Blood pressure on three consecutive days, starting from the day of registration.

The no. of long kriya was given more importance in deciding compliance criterion because short kriya were self reported as they were performed at home, where as long kriya were performed under supervision on the day of follow up .

After 4 months, measurement of blood pressure and pulse rate was done again. Values of SBP, DBP and Pulse rate are shown in terms of mean & standard deviation. Paired T test was applied to compare the difference in the mean values of SBP, DBP and pulse rate before and after 4 months practice of SKY. SPSS was used for statistical analysis of data.

Results :

Table no.-1 Age wise frequency & percent of subjects (N = 30)

Age interval	Frequency	Percent
30-35 yr	6	20
36-40 yr	5	16.7
31-45 yr	11	13.3
46 - 50 yr	4	100
51 - 55 yr	4	
Total	30	

Table no.-2 showing significant lowering of SBP, DBP & PR after 4 months practice of SKY (N = 30)

Parameters	Before practicing SKY (Mean ± SD)	after 4 months practice of SKY (Mean ± SD)
SBP (mm Hg)	142.87 ± 8.283	138.33 ± 6.261***
DBP (mm Hg)	93.07 ± 5.552	89.27 ± 4.996***
PR / min	88.97 ± 10.132	84.27 ± 7.625***

SBP = systolic blood pressure, DBP = diastolic blood pressure, PR = pulse rate, SKY = Sudarshan kriya yoga

*** = P < 0.001

Total 30 subjects were hypertensive. Number of Male and female subjects were 15 each. Mean age was 42.7 ± 1.29 Yrs. Result shows that practice of SKY for 4 months significantly lowered the SBP, DBP & pulse rate.

Discussion:

Yoga & relaxation techniques are becoming more & more popular in the world, they provide physical fitness, mental relaxation and self awareness, which helps in fighting against stress & strain of life.

Comprehensive yoga like SKY is not just physical activity but an incorporation of asana (body postures), pranayams (breathing Techniques), meditation, attitudinal & behavioral modification and mental discipline.¹

Several studies have proven beneficial effect of different forms of yoga & relaxation techniques as an adjuvant treatment of chronic diseases like hypertension, Diabetes, asthma, obesity, neuromuscular diseases & psychiatric illnesses etc.

A study conducted in 25 hypertensive patients showed decrease in the doses of antihypertensive medicines after 6 months practice of Shavasana.² Another study found fall in SBP, DBP & PR after 4 and half month practice of a yoga module consisting of surya namaskar, asans and meditation.³ One study found decrease in SBP, DBP, PR, RR and rise in PEFR after 4 week practice of Nadisuddhi pranayam (Alternate nostril breathing).⁴

Many studies have also been done to show beneficial effects of SKY on different parameters like SBP, DBP, HR, RR, PEFR, Lipid profile, anxiety scores etc.

A study conducted on 100 hypertensive subjects for 3 months found significant benefit of SKY in SBP, DBP, PR, lipid profile and anxiety scores.⁵ Another study conducted on 100 healthy subjects has shown fall in SBP, DBP, PR and improvement in PEFR after 3 month practice of SKY.⁶ Significant reduction in SBP, DBP, PR, and RR was observed in one study done in 30 healthy subjects after 12 weeks practice of SKY.⁷ Another Study conducted on 30 normotensive medical students has shown fall in MBP & improvement in lipid profile after 3 months practice of SKY.⁸

Our study was intended to see the effect of SKY, (a form of comprehensive yogic breathing technique) on Blood Pressure and pulse rate in Hypertensive subjects. There was significant decrease in the mean values of SBP, DBP and Pulse rate after 4 months practice of SKY.

Various mechanism have been explained by different researchers to explain decrease in SBP, DBP and PR in hypertensive patients by different forms of yoga and relaxation techniques.

SKY and other forms of yoga and pranayams create a balance in autonomic nervous system by parasympathetic dominance and decreasing sympathetic drive.⁷ Slow ujjayi breathing in SKY increases parasympathetic activity which explains decrease in Heart rate.⁹ SKY also improves baroreceptor reflex sensitivity and decreases chemoreflex sensitivity.^{10,11,12} Contraction of laryngeal muscles with partially closed glottis during slow ujjayi breathing in SKY also stimulates vagus nerve.¹⁰

Prolonged voluntary expiration increases intrathoracic pressure and causes squeezing of blood from lungs into heart leading to increased stroke volume which causes more baroreceptor discharges, which in turn inhibit discharge of vasoconstrictor nerves through vasomotor center and excites vagal innervations of heart producing vasodilatation, fall in SBP

and decrease HR. Vasodilatation decreases peripheral resistance leading to fall in DBP.^{13,14} Also decreased sympathetic activity decreases catecholamine secretion causing vasodilatation and fall in DBP.¹⁵ During breathing exercises synchronization within hypothalamus and brainstem is probably responsible for parasympathetic response.¹⁶ Meditation decreases stress and anxiety by influence on hypothalamus which decreases fat deposition and hence beneficial in hypertension.¹⁷ Decrease in stress hormone "Cortisol" and increase in well being hormone "Prolactin" shows stress relieving and relaxant effects of Yogic breathing process.¹⁸

The principle limitation of our study is small sample size, as some of the participants could not fit into compliance criteria of the study and were excluded. Secondly, the criteria of compliance to monitor SKY practice were arbitrary and influenced from a study done in AIIMS, New Delhi. Lastly compliance of home practice of SKY was self reported by subjects. A further study using large sample size is needed to prove efficacy of SKY as a complementary therapy in Hypertension.

Conclusion :

Our study showed significant lowering in SBP, DBP and Pulse rate in hypertensive subjects, after 4 months practice of SKY. Most likely mechanism is by creating balance in autonomic nervous system by parasympathetic dominance and decreased sympathetic drive. Thus Sudarshan Kriya Yoga may be used as an adjuvant therapy for more effective management of hypertension.

REFERENCES

- Viveka P. Jyotsana, Anshumali Joshi, Smita Ambekar, Neeta Kumar, Anju dhawan, Vishnubhatla Sreenivas. Comprehensive yogic breathing improves quality of life in patients with diabetes. Indian J Endocrinol. Metab. Feb 16, 2013; IP: 129.240.90.114.
- Sundar S, Agrawal SK, Singh VP, Bhattacharya SK, Udupa KN, Vaish SK. Role of yoga in management of essential hypertension, 1984;39(3):203-8.
- Saneeta Jain, Meeta Jain. Effect of yoga and relaxation techniques on cardiovascular system. IJPP 2010;54(2):183-185.
- K Upadhyay Dhungel, V Malhotra, D Sarkar and R Prajapati, effect of alternate nostril breathing exercise on cardiorespiratory functions. Nepal Med Coll J. 2008;10(1):25-27.
- Pranod Kumar Narnolia, Bijendra Kumar Binawara et al. Effect of Sudarshan Kriya Yoga on cardiovascular parameters and comorbid anxiety in patients of hypertension. Sch. J. App. Med. Sci.; 2014; 2(6P): 3307-3314.
- Jasmin Parmar, Pankaj Panchal et al. Effect of Sudarshan Kriya on heart rate, blood pressure and peak expiratory flow rate. Int J Res Med. 2014; 3(4):51-53.
- Somwanshi S.D. Handergulle S. Adgaonkar B. Effect of Sudarshankriya Yoga on Cardiorespiratory Parameters, Int J of Recent Trends in Science and Technolog, Volume 8, Issue 1, 2013 pp 62-66.
- Nisar Ahmad, Shah Nawaz Hasan, Raj Kumar Goel, impact of Sudarshan Kriya Yoga on mean blood pressure and biochemical parameters in medical students. IJRM 2016 vol 4 no.6.
- T.V.R. Yoga based guided relaxation reduces sympathetic activity judged from baseline level. Psycho Rep. 2002;90:p.487-494.
- Brown RP, Gerberg PL; Sudarshan Kriya Yogic breathing in the treatment of stress, anxiety and depression: part neurophysiologic model. J Altern Complement Med., 2005; 11: 189-201.
- Bernardi J, Gabutti A, Porta C, Spicuzza L; Slow breathing reduces chemoreflex response to hypoxia & hypercapnia and increases baroreflex sensitivity. J Hypertension, 2001;19:2221-2229.
- Bowman AJ, Clayton RH, Murray A, Reed JW, Subhan MM et al.; Effects of aerobic exercise training and yoga on the baroreflex in healthy elderly persons. Eur J Clin Invest. 1997;27:443-449.
- Ganong WF: Cardiovascular regulatory mechanism. In Review of Physiology, 22 nd edition, 2005:597-610.
- Hainsworth R; Circulatory responses from lung inflation in anaesthetized dogs. Amer J Physiol., 1974;226:247-255.
- Tapas Pramanik HOSSMRPaSS. Immediate Effect of slow pace Bhastrika pranayam on Blood Pressure and Heart Rate. Journal of alternative and complementary medicine. 2009 March; 15(3):p. 293-295
- Newberg A, Iversen J; The neural basis of the complex mental task of meditation : neurotransmitter and neurochemical considerations. Med Hypothesis, 2003;61:282-291.
- Sharma VK, Das S, Mondal S, Goswami U: Effect of Sahaj yoga on autonomic functions in healthy subjects and patients of major depression. Biomedicine, 2008; 28:139-141.
- Vedamurthachar A, Bijoar A R, Agte V, Reddy S, Lakshmi B; short term effect of Sudarshan Kriya Yoga on lipid and hormone profile of type 2 diabetic patients. Research Journal of chemical Science, 2011;1(9): 83-86