Influence of Kayotsarga (Relaxation with self-awareness) practice on Cardio-Pulmonary Functions

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Abstract:
This study attempts to assess the influence of *Kayotsarga* on cardio-pulmonary functions of adult females. For this purpose 60 subjects were randomly selected in the age group of 18 to 25 with same educational status and were divided into two groups i.e. experimental (30 subjects) and control group (30 subjects). Experimental group of subjects were given intervention of *Kayotsarga* for the whole intervention period of four months. All subjects of both the groups were evaluated three times in this study. First evaluation was conducted on the onset of the experimental work, second and third evaluation was conducted after two and four months respectively. All the parameters of evaluation i.e. Blood Pressure, Heart Rate, RR Interval and Breathing Rate were recorded by using standard techniques in physiology laboratory situated at Department of Science of Living, Praksha Meditation and Yoga, JVBI, Ladnun under controlled environmental conditions. Intra and Inter group comparisons were made with the aim to evaluate the net effect of practice module. Student 't' test was applied and $p \leq 0.05$ (*) *and* $p \leq 0.01$(**) was taken as level of significance. Result shows that the practice of *Kayotsarga* altered the levels of systolic and diastolic blood pressure in a positive way in subjects of experimental group. Heart rate and Breathing rate were also found decreased and RR interval was increased significantly after four months intervention of *Kayotsarga*. On the basis of findings of the study it may be concluded that short term practice of *Kayotsarga* facilitates the reduction in autonomic functions by bringing in Para-sympathetic dominance.

Key Words: *Kayotsarga*, Blood pressure, Heart rate, RR interval and Breathing rate.

Introduction:

Development brings a lot of changes in our lifestyle and due to these changes we are giving dominance to mental work over physical activities and thus facing tremendous pressure. That attitude creates stress and tension and because of that we not only become failure to maintain healthy life but also suffer with several psychosomatic diseases and disorders like insomnia, anxiety, depression, cardio-respiratory diseases etc.

Yoga and meditation practices affect our breathing pattern and due to that affect breath become stable (Jensen et al., 2012). Such practices have shown a significant increment in Peak Expiratory Flow Rate (PEFR L/min) and Pulse Pressure (PP). Systolic Blood Pressure (SBP) was decreased insignificantly along with the significant decrease in Pulse Rate (PR), respiratory rate (RR), diastolic blood pressure (DBP) (Upadhyay, 2008). Khattab and Khattab (2007) sated that relaxation by yoga training significantly improve cardiac autonomic nervous tone through parasympathetic stimulation which could be a suitable intervention in cardiac rehabilitation programs.

Madanmohan et al. (2004) observed the effect of six weeks of '*shavasan*' training on spectral measures of short-term heart rate variability in young healthy volunteers results shows that *shavasana* training for 15 minutes a day, 4 days a week, for six weeks significantly affect heart rate variability in young healthy subjects. Cusumano et al. (1992) in their study explored the positive effects of hatha yoga and progressive relaxation on heart rate, blood pressure, physical self-efficacy, and self-esteem. Throll. (1982) found that a Transcendental Meditation group displayed

a significant decrease in heart rate than a group using Jacobson's progressive relaxation. Similar results were also found by Wallace 1970, Wallace et al 1971, Delmonte 1984, Sudsuang et. al. 1991, Telles et. al. (1991, 1993, 1994, 2000, 2004, 2008 & 2011), Wallace et. al 1983, Schneider et. al. 1998, Damodaran et. al. (2002), Barnes et. al. (2004), Bhargava (1988) and Vyas et. al. (2002).

Kayotsarga means abandonment of the body coupled with high degree of conscious awareness. In practice, it is conscious suspension of all gross movement of the body, resulting in relaxation of the skeletal muscles and drastic reduction in metabolic activities. Such physical condition helps in relieving mental tension and is an essential precondition for meditational practices (Kumar, 1999). It is an effective remedy for psychosomatic problems. In the present age medical science has fully revealed the truth that most of our problems are caused by mental stress. Through *Kayotsarga* this stress can be effectively relieved. As the stress decreases problems become less intractable (Mahaprajna, 2003).

Methods:

60 healthy adults in the age group of 18–25 years were randomly selected who were not having any past history of cardiac and respiratory disorders. All the subjects were having similar lifestyle and socio-economic conditions at par. After taking their written consent and case history they were divided randomly in to two groups equally i.e. control group (N=30) and experimental group (N=30). The subjects of experimental group were given training of complete ***Kayotsarga*** (Meditative Relaxation) for one hour daily in the morning hours except Sundays and holidays, whereas subjects of control group were not given any such training and let live their routine life without any specific instruction. All the parameters i.e. Blood Pressure, Heart Rate, R-R Interval and Breathing Rate were recorded three times i.e. pre phase (before experimental intervention), post phase-01 (after 30 days) and post phase-02 (after 120 days) in both the groups by using standard techniques of estimation and evaluation as given in the literature in physiology laboratory situated at Department of Science of Living, Praksha Meditation and Yoga, JVBI, Ladnun under controlled environmental conditions. Intra and Inter group comparison was made with the aim to evaluate the net effect of practice module. Student 't' test was applied and $p \leq 0.05$ (*) *and* $p \leq 0.01$(**) was taken as level of significance.

Results:

Blood pressure:

At the onset of experiment both groups were in the state of homogeneity, no significant difference was there in the values of systolic blood pressure. After two months of experimental intervention a significant decline in both systolic and diastolic blood pressure were noticed in experimental group of subjects and this decline persist after 120 days. No such significant difference was there in control group of subjects when compared at different intervals (Graph SBP and Graph DBP).

Heart Rate

A gradual and significant decrease in heart rate of experimental group of subjects was noticed after experimental intervention for 60 days and 120 days. Control group showed no such decrease and remain in same range. When we compared both groups at different intervals, after 120 days the difference was significant but at onset both groups were in homogeneity (Graph HR).

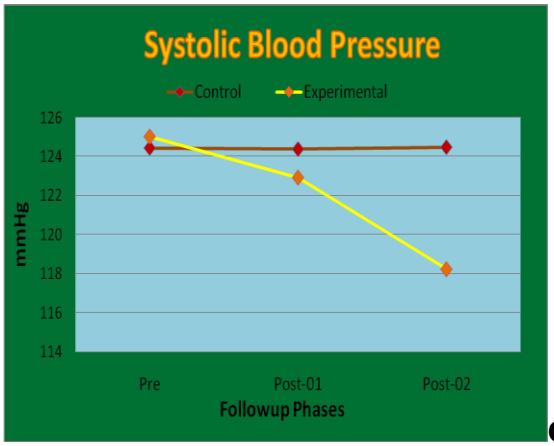
R-R Interval

Significant increases in RR interval in experimental group after 60 days of experiemental intervention suggest relaxation of heart. In experimental group this increase was again significant after 120 days. There was no such significant difference on both stages in control group. When we compared both groups at different intervals, at on set no significant difference was there but after 60 and 120 days both groups have shown a significant difference. This may be due to experimental intervention i.e. Kayotsarga (Graph R-RI).

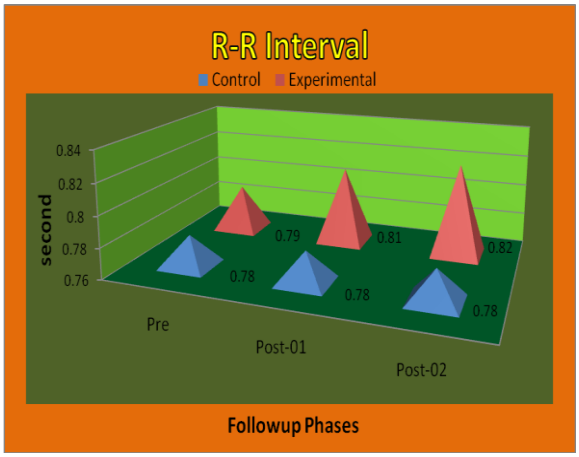
Breathing Rate

The breathing rate of both groups was similar at onset of experiment without any significant difference but after 120 days a significant increase in

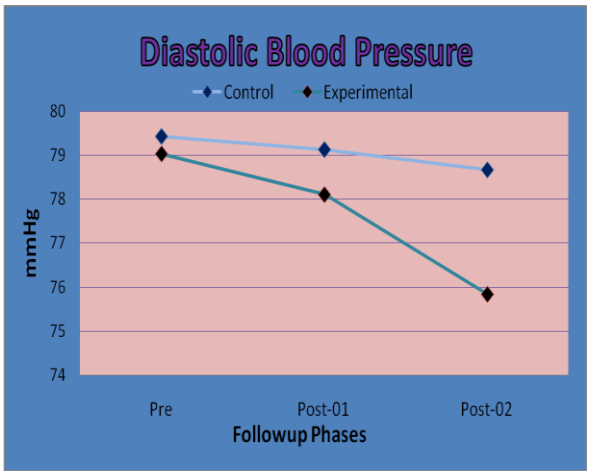
breathing rate in experimental group was there. When we compare experimental group's mean values between 0 day, 60 days and 120 days a significant increase was there. No such difference was observed in control group at any stage of experiment (Graph BR)



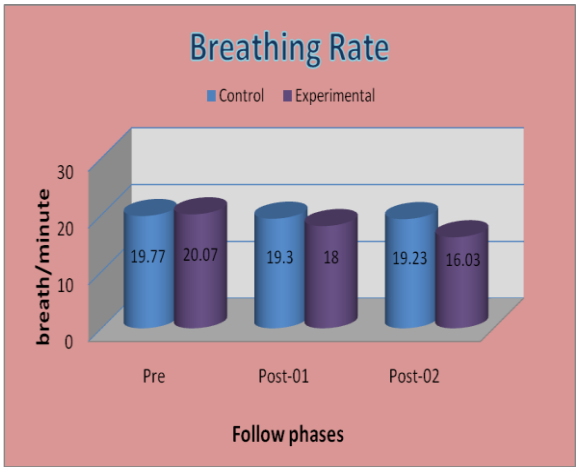
Graph SBP: Systolic Blood Pressure of control and experimental group of subjects



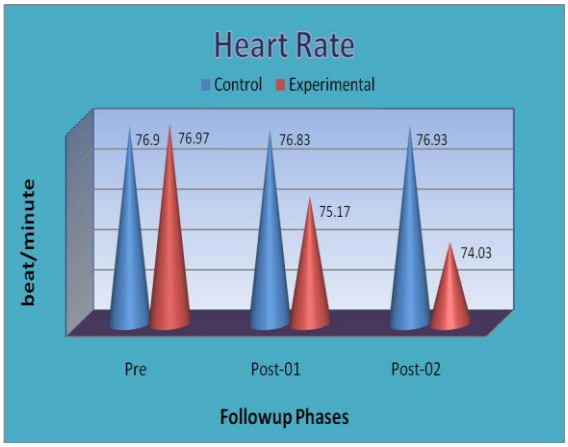
Graph R-RI: R-R Interval of control and experimental group of subjects.



Graph DBP: Diastolic Blood Pressure of control and experimental group of subjects.



Graph BR: Breathing Rate of control and experimental group of subjects.



Graph HR: Heart Rate of control and experimental group of subjects.

Discussion and Interpretation:

Blood pressure:

The findings of the present study indicated a significant decrease in Blood Pressure after two months in the subjects practicing experimental practice module which further continued till second follwup period i.e. four months.

Sympathetic vasomotor nerve fibers leave the spinal cord and pass into the sympathetic chain and then by two roots to the circulation: (1) through specific sympathetic nerves that innervate mainly the vasculature of the internal viscera and the heart and (2) through the spinal

nerves that innervate mainly the vasculature of the peripheral areas. The innervation of the smaller arteries and arterioles allows sympathetic stimulation to increase the resistance and thereby to change the rate of blood flow and blood pressure. The parasympathetic nervous system, although plays a minor role in regulation of circulation, its most important circulatory effect is its control of heart rate by way of parasympathetic fibers carried to the heart in the vagous nerve. Principally parasympathetic stimulation causes a marked decrease in heart rate, blood flow and blood pressure (Guyton, 1991). Most probably this mechanism might have brought in the changes in blood pressure which were observed in the present study.

Yoga and meditation practices stimulate the autonomic nervous system by enhancing and strengthening the functioning of parasympathetic component and simultaneously suppressing the sympathetic components (Mahaprajna, 1994). Our findings are in conformity with the pathway of mechanism of action of Yoga and Meditation, derived by exponent scientific investigators. These include the studies of Bhargava et al. (1988), Roopakala et al. (2002) and Mishra and Shekhawat (2007) who reported significant reduction in the systolic blood pressure after pranayamic breathing. Mishra (1995) has stated that a short term practice of *Deergha swas preksha and anuloma viloma* pranayama have played a significant role in obtaining integrated health state along with individual performance.

Heart rate and R-R interval:

The findings of the present study have very clearly shown a significant decline in the heart rate of experimental group of subjects, which were practicing the *Kayotsarga*.

In earlier studies it was found that meditation practice results in significant decrease in heart rate, blood pressure, rate pulse pressure, mean pressure and increase in RR interval. Significant variation in spectral measurement of heart rate in experimental group of subjects practicing yoga could possibly due to variation in cardiac responsiveness to the change in vagal nerve traffic to the heart through parasympathetic channel (Singh et al, 1999). The finding of this study are on the same line, probably with similar mechanism too.

Breathing rate:

A significant decline in breathing rate was observed by usin the subjects who practiced intervention module. Similar findings were also reported by Jensen. (2012); Telles. (2011) and Pramanik. (2009).

Slow breathing may reduce sympathetic activity by enhancing central inhibitory rhythms (Naughton, 1998) and, conversely, have an impact on baroreflex sensitivity. Furthermore, activation of the Hering–Breuer reflex due to an increase in tidal volume during slow breathing (Bernardi, 2001b) reduces chemoreflex sensitivity and might, therefore, ameliorate baroreflex function (Goso, 2001; Bernardi, 2001a & Spicuzza, 2000). Additionally, reducing the respiratory rate to 6 breaths per minute entrains R–R interval fluctuations, causing a merging with the respiratory cycle as well as a considerable increase in amplitude relative to blood pressure changes. This may lead to enhanced baroreflex efficiency (Bernardi, 2002).

Conclusion: Hence it may be concluded that whatever changes has been observed following the practice of *Kayotsarga*, an integral component of Preksha Meditation, may be the sum total of various neuromuscular control efforts over the respiratory functions of the subject.Finally it may be postulated that Kayotsarga seems to be an effective tool to modulate various physiological functions and helps obtaining the state of good physiological health and well being.

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