

LETTER TO THE EDITOR

HEART RATE ALTERATIONS IN DIFFERENT TYPES OF PRANAYAMAS

Sir,

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Pranayama is a state of voluntarily regulated breathing while the mind is directed to the feeling of the flow of breath or prana (1). A typical cycle of the slow type pranayamic breathing involves the phases of inhalation, exhalation, and timed breath-holding (kumbhak) either at end-inspiration stage or at end-expiration, or at both stages. There are different kinds of pranayamas, varying according to the durations of the phases in the breathing cycle, and in other details like the nostrils used, and bandhas employed.

This report presents the differences in heart rate changes in 4 different kinds of pranayamas practised by a subject who had several years of experience.

At the time of the study, VJ was a 49 year old healthy male, with about 5 years of experience in practising different types of pranayamas (Fig. 1). The EKG of standard limb lead II, and respirogram via a mercury strain gauge wrapped around the chest, were recorded on a Beckman dynograph. The subject practised 4 types of pranayamas in the same session separated by 5 minute periods of relaxation in sukhasan in between the 4 pranayamas. The 4 pranayamas differed in the ratios of the durations of respiratory phases in a pranayama breathing cycle, i.e. inspiration (I) : Kumbhak at end-inspiration (K-I) : expiration (E) : khumbhak at end-expiration. These ratios were as follows : (1) in Savitri pranayama (SP) I:K-I:E:K-E = 2:1:2:1; (2) in Nadisuddhi pranayama (NP) I:K-I:K-E = 1:1:1:1; (3) in Mahatyoga pranayama (MP) (3 phases) I:E:K-E = 1:1:0.25; and (4) in Vibhaga pranayama (VP) I:E:K-E = 1:1:0.20.

The results revealed an overall increase of heart rate during two pranayamas (VP and MP) of the 4 pranayamas, compared to the respective prepranayamic baseline values of the sukhasan sitting state (Table I). These 2 pranayamas (VP, MP) have no end-inspiratory kumbhak (K-I), and have only a short end-expiratory kumbhak (K-E). In the other two pranayamas (SP and NP), i.e. the two varieties which had end-inspiratory (K-I) and end-expiratory (K-E) kumbhak phases, the mean of the overall heart rate was not significantly altered.

A previous report (2) on heart rate changes in Savitri Pranayama showed that the heart rate was higher during inspiration than during expiration, in eupnoea, during deep breathing, and during Savitri pranayama.

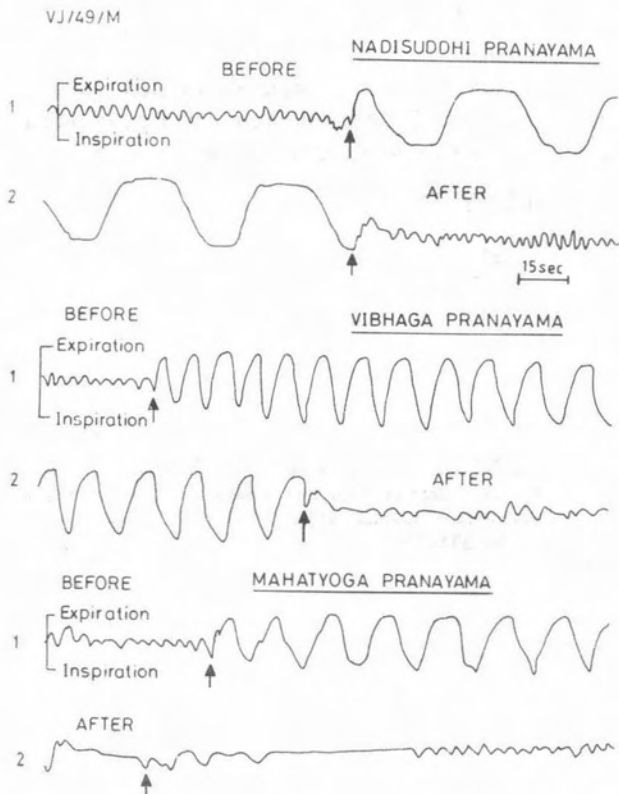


Fig.1 : Respirogram record taken before, during (1) and after (2) : Nadisuddhi, Vibhaga and Mahatyoga pranayamas.

TABLE I: Heart rate and respiratory rate changes in 4 different pranayamas.

Parameters	I	II	III	IV	V
	Normal breathing Eyes closed, in Sukhasan	Vibhaga Pranayama	Mahatyoga Pranayama	Savitri Pranayama	Nadisuddhi Pranayama
Heart rate per minute	76.50 ± 3.89	92.16 ± 1.75*	87.37 ± 2.86*	78.83 ± 2.11	77.64 ± 1.97
Respiratory rate per minute £	17.25 ± 1.19	4.33 ± 0.28	3.62 ± 0.14	2.48 ± 0.18	1.42 ± 0.12
Number of values averaged	4	3	4	6	7

\* P<0.05 against value of eyes closed (Sukhasan), Student's t – test (2 tailed). £ : No statistical comparisons were made with 'eyes closed (sukhasan)' value as respiration was voluntarily slowed down. I : inspiration phase, K – I : kumbhak phase at end-inspiration, E : expiration, K – E : kumbhak phase at end – expiration.

However, the increased rate during the inspiratory phase of Savitri pranayama was significantly more than for eupnoea or deep breathing. In present report in two pranayamas (MP, VP) the heart rate was more during inspiration (mean ± S.D. 90.5 ± 2.4 beats/min) and less during expiration (mean±S.D. 87.0 ±3.0 beats/min). Both values were significantly higher than corresponding (i.e. inspiratory or expiratory) values of quiet breathing in the preceding baseline period. In the 2 remaining pranayamas (SP, NP) the heart rate was higher during expiration (mean ± SD 78.0 ± 0.5 beats/min) than during inspiration (mean 74.1 ± 2.0 beats/min). However, the highest value was during the end-inspiratory kumbhak (mean ± S.D. 79.1 ± 2.2 beats/min) and lowest during

end-expiratory kumbhak (Mean ± S.D. 71.9 ± 0.3 beats/min). The inspiratory and expiratory heart rate values did not differ significantly from the corresponding values of the preceding baseline period.

This is an example showing that different types of heart rate alterations may occur in different types of pranayamas, and that the short kumbhak type of pranayamas may not cause a change in the mean heart rate.

SHIRLEY TELLES\* AND T. DESIRAJU

Department of Neurophysiology,  
National Institute of Mental  
Health and Neuro Sciences,  
Bangalore – 560 029

#### REFERENCES

1. Behanan KT. Yoga: a scientific evaluation. New York, Dover Publications, Inc. 1937.
2. Mohan M, Saravanane C, Surange SG, Thombre DP, Chakrabarty AS. Effect of yoga type breathing on heart rate and cardiac axis of normal subjects. *Indian J Physiol Pharmacol* 1986; 30: 334–340.