

## LETTERS TO THE EDITOR

### COMMENTS ON THE ARTICLES ON YOGA

( Received on 28, January 1993 )

Sir,

I would like to comment on three articles on yoga published recently in IJPP.

Regarding the article on the effect of yoga on reaction time, respiratory endurance and muscular strength (1) :

1. The names of asanas like Navasan, Navkasan and Mukhabhastrika are not mentioned anywhere in the traditional texts on yoga.

2. The duration of 18 yoga exercises was 30 min and the total practice session was also held for 30 min. How was this done? Was there no interval at all between exercises?

3. A control group should have been studied and matched for such parameters which are dependent upon age and since the pre and post measurements are separated by 3 months.

Regarding the letter on heart rate alterations in parnyamas (2) :

1. Names of Pranayama have no traditional support from ancient texts, except Nadisuddhi Pranayama. The readers will therefore have no idea about the technique of Vibhaga, Mahat Yoga and Savitri Pranayama.

2. If a person is well trained and has been practising for 4 years, heart rate should not increase so much. Marginal increase of 5 to 7 beats/min is understandable. That means the present subject was practising with muscular exertion.

3. The ratios given for Vibhaga and Mahat yoga

are objectionable; i.e., 1:1:0.20 and 1:1:0.25 respectively. The traditional ratios are 1:2:2, 1:4:2 (Hathapradipika) and 6:8:5 (Goraksha Samhita Ch. II:4) for Purak, Kumbhak and Rechak.

Regarding the letter on heart rate and respiratory changes accompanying single thought and thoughtless states (3) :

1. How did the investigator confirm whether the subject was really in "single thought" or "no thought" state of mind? Thoughtless condition is almost difficult to achieve since it is related to the degree of arousal of the brain.

2. From the respirogram it appears that the subject was not in the "No thought" state because mainly the expiratory phase of the respiratory cycle is seen disturbed, indicating cortical interference in the autonomic function. In single thought at least it is minimum.

3. The scale of 20 sec given in the graph and rate of respiration given in the Table do not correspond. From the scale it seems to be 12/min in normal, 8/min in the first single thought state (upper line), 10/min in next single thought state (third line) and 7 to 11/min in 'no thought' state. Increased respiratory rate and decreased amplitude indicate sympathetic predominance and an anxious state of mind.

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### REFERENCES

1. Madanmohan, Thombre DP, Balakumar B, Nambinarayanan TK, Thakur S, Krishnamurthy N, Chandrabose A. Effect of yoga training on reaction time, respiratory endurance and muscle strength. *Indian J Physiol Pharmacol* 1992; 36: 229-233.
2. Telles S, Desiraju T. Heart rate alterations in different types of pranayamas. *Indian J Physiol Pharmacol* 1992; 36: 287-288.
3. Telles S, Desiraju T. Heart rate and respiratory changes accompanying yogic conditions of single thought and thoughtless states. *Indian J Physiol Pharmacol* 1992; 36: 293-294.

## DR. MADANMOHAN'S REPLY

( Received on April 10, 1993 )

Sir,

We are thankful to Dr. Gore for his reaction to our paper (1). We give our point-by-point response to his comments.

1. The techniques of Navasan, Navakasan and Mukhabhastrika are given on pages 80, 76 and A-77 respectively of "Yoga: Step-by-step" by Gitananda Swami (2). Yogeswar describes Navasan as naukasana-supine and Navakasan as Naukasana-prone (3). Navakasan is described as Naukasana in Yogasan Vijnan by Dharendra Brahmachari (4). We have followed the method and terminology given by Gitananda Swami (2). In brief, Navasan is assumed from the supine position by raising the upper part of the body and the legs on an incoming breath so that the toes are in line with the nose. The resultant boat-like posture is maintained for the required duration. Navakasan is the opposite posture of Navasan and is assumed from the prone position. Mukhabhastrika, a bellows type breathing is done by taking in a full breath and blasting out the air in short, repetitive 'whooshes' while the lips are pursed (in 'kaaki mudraa').

2. The different yoga techniques followed each other without any rest period between them. An interval of a few seconds between the postures does not make any significant difference.

3. We agree that it would have been ideal to have a control group. However, while one can have any number of experimental animals like rats, it is difficult to get healthy, cooperating volunteers for control study. The period of yoga training was only 3 months and the subjects formed their own control. Hence a separate control group was not incorporated. The magnitude of changes observed in our study is so large that these cannot be attributed to factors other than the experimental intervention which was yoga in the present study. We do not expect changes in reaction time, respiratory pressures and breath holding time with increase in age (3 months in our study).

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1. Madanmohan, Thombre DP, Balakumar B, Nambinarayanan TK, Thakur S, Krishnamurthy N, Chandrabose A. Effect of yoga training on reaction time, respiratory endurance and muscle strength. *Indian J Physiol Pharmacol* 1992; 36: 229-233.
2. Gitananda Swami. *Yoga: step-by-step*. Pondicherry: Satya Press, 1981: 4-229.
3. Yogeswar. *Textbook of Yoga*. Madras: Yoga Centre, 1982: 91-433.
4. Dharendra Brahmchhari. *Yogasan Vijnan (Hindi)*. New Delhi: Dharendra Yoga Prakashan, 1966: 117.

## DR. TELLES'S REPLY

( Received on April 12, 1993 )

Sir,

Regarding our letter on heart rate alterations in pranayamas (1):

1. Pranayama has been described as voluntary regulation of breathing (more often slowing down) which ultimately achieves a calm state of mind. In Savitri pranayama the subject strives to regulate the ratios (inhale : End-inspiratory Kumbhak : expiration: end-expiratory Kumbhak) as 2:1:2:1. In Mahat Yoga and Vibhaga pranayamas there is virtually no emphasis on the ratios. Breathing is expected to be slow and rhythmic.

We found that the pattern was consistent and there was no attempt to consciously regulate it. In Mahatyoga the mind was allowed to be engaged in thoughts of union of self with the Supreme, whereas in Vibhaga Pranayama the attention was focussed on three different (imaginary) sectors of the lungs i.e. upper, middle, and lower.

2. It is possible that in spite of having more than five years' experience, the subject was practising Pranayama with muscular exertion.

3. As mentioned in the first response Vibhaga and Mahat Yoga Pranayamas were not similar to the traditional pranayamas (with ratios 1:2:2 or 1:4:2).

Regarding our letter on heart rate and respiratory changes accompanying single thought and thoughtless states (2) :

1. Studies by Roland and Friberg (3) have reported changes in regional cerebral blood flow with different types of targetted thinking (e.g. mentally tracing a route or repeating silently a meaningless jingle). In the absence of such facilities, other measures such as recording the cerebral evoked potentials would have given only a very gross neural correlate of the state of thinking since the neural generators of middle and long latency evoked potentials are still poorly understood. Hence, in the study reported, we relied wholly on the subjective report of the Yoga practitioner.

2. The comment "because mainly the expiratory phase of respiratory cycle is seen disturbed, indicating cortical interference in autonomic function" is not entirely logical. Voluntary control can be expected to alter either the inspiratory and/or the expiratory phase of respiration. Quite apart from this, it is reasonable to assume that changes in neural activity related to thinking (or a thoughtless state) would influence other parts of the brain, and possibly alter the respiration. It would be very unusual to expect that a 'no thought state' would occur simultaneously with an absence of cerebral activity.

3. It may be pointed out that the graph gave only one representative sample of the respirogram recorded during 'no thought' and 'single thought' states. In contrast, values shown in the Table were mean values  $\pm$ S.D.

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1. Telles S, Desiraju T. Heart rate alterations in different types of pranayamas. *Indian J Physiol Pharmacol* 1992; 36: 287-288.
2. Telles S, Desiraju T. Heart rate and respiratory changes accompanying yogic conditions of single thought and thoughtless states. *Indian J Physiol Pharmacol* 1992; 36: 293-294.
3. Roland PE, Friberg L. Localisation of cortical areas activated by thinking. *J Neurophysiol* 1985; 53: 1219-1243.