

(1) MEDITATION IS NOT MERE RELAXATION': COMPARISON OF EFFECTS OF MEDITATION AND RELAXATION ON BASIC CARDIORESPIRATORY PARAMETERS.

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Abstract

Introduction:

In today's hectic routine we are being subjected to increasing levels of stress, which has become a part and parcel of our life and just can't be avoided. Mankind is thus increasingly on the lookout for various lifestyle modifications. Amongst these modifications, Meditation is proving out to be one of the most universally feasible solution to this modern day stressful condition.

Objective:

Widely proclaimed therapeutic benefits of meditation have motivated us to conduct the present study in order to evaluate the physiological response patterns obtained by meditation on basic cardio respiratory parameters like pulse rate and respiratory rate.

Method:

The study was conducted on 30 Meditators and 30 Non-meditators. The Non-meditators were used as controls and were made to relax in the lying position. Pulse rate and respiratory rate were taken in three phases in both the groups, that is 1) before 2) during and 3) after meditation or relaxation as per the respective group.

Results:

Analysis of the study revealed a significant fall in respiratory rate as well as pulse rate in the meditators during phase 2 and phase 3. But similar effects were not observed in the Non-meditator group in any of the phases of relaxation.

Conclusion:

Meditation causes decrease in both respiratory rate as well as pulse rate and thereby the heart rate.

Key words

Pulse rate, Respiratory rate, meditation, relaxation

Introduction

Considering today's stressful and modern-day hectic schedules Humanity is increasingly turning towards various lifestyle modifications. Unable to locate stability and serenity in the outside world people have directed their gaze inwards in a bid to attain peace of mind. Meditation is the first mind body intervention to be widely adopted in mainstream health care in the western society and around the world. Varied positive physiological, psychological and spiritual benefits are known to be achieved through meditation. Meditation since generations has helped most people feel less anxious, and results in a state of relaxation, by being a source of personal insight and self-understanding. These subjective experiences may have relevance from a clinical or research perspective. Transcendental meditation, Sahajayoga, Vipassana and Mindfulness meditation (1) are some of the more established methods of meditation.

Generally the entire process of meditation entails the following stages: concentration (dharana), absorption (jhana) and one pointedness (samadhi) often followed by the stage of knowledge (nana) (2).

Meditation is a wakeful hypometabolic state which is accompanied by a decreased breathing pattern, decreased heart rate and decreased blood pressure. There is also a marked decrease in level of O₂ utilization and CO₂ elimination by the muscles (3,4,5,6,7). This reduced metabolic status is brought about at the cellular level as an effect of meditation and not from a forced reduction of breathing (4). Meditation also due to its effect on the autonomic nervous system has been shown to affect heart rate and cutaneous peripheral vascular resistance (6). Taking into account the above benefits the present study was thus conducted to find out the effect of meditation on biophysical parameters like pulse rate and respiratory rate.

Materials and Methods

30 meditators and 30 non-meditators were included in the present study. The study was conducted at Grant Govt. Medical College and J. J. Hospital, Mumbai, after obtaining approval from the institutional ethical committee. The selection criteria of the subjects who were in the age group of 27 to 65 years were as follows.

- 1) Strict vegetarian diet.
- 2) No smoking habit.
- 3) No history of alcohol intake.
- 4) No past history of hypertension.
- 5) Systolic Blood pressure not more than 130 mm Hg and diastolic Blood pressure not more than 90 mm Hg.
- 6) Not a known case of hyperglycemia or hyperlipidemia.

'Sadhaks' from Mumbai based Prajapati Brahmakumari Ashram who were practicing regular meditation for a minimum period of 6 months prior to the conduction of study comprised the subjects of Group I (meditators).

Volunteers randomly chosen from the normal healthy population who never practiced any kind of meditation formed the subjects of Group II (non-meditators) who were used as controls.

The procedure for the study was carried out during the morning hours in the following manner.

Group I subjects were asked to perform 30 minutes of concentrative meditation.

Group II subjects were asked to just relax by lying supine for 30 minutes.

Respiratory Rate and Pulse rate were taken in both the groups in three different phases, that is 1) prior to 2) during and 3) after their respective procedures. Respiratory rate was counted by the standard routine procedure of observing the movements of the chest wall of the subjects for one complete minute. The pulse rate was counted in the Radial artery of the Right forearm by palpatory method for one complete minute. A stop watch calibrated to 1/100th of a second was used to measure the time for both the parameters. The observations thus obtained were noted down and used for subsequent statistical analysis.

Statistical analysis

The statistical analysis of the data obtained for the meditator and non meditator groups were done using paired t test and p value of less than 0.05 was considered significant and those less than 0.001 was considered highly significant. The results obtained on analysis were presented as Mean \pm Standard Deviation for each of the parameters.

Observation and Results

The meditator group showed highly significant reduction ($p < 0.001$) in respiratory rate as well as pulse rate on comparison of phase 1 with phase 3. In group II subjects undergoing relaxation significant reduction ($p < 0.05$) in pulse rate was noted while comparing the pulse before and after relaxation. But on comparison of respiratory rate no such reduction was found between phase 1 and phase 3 of relaxation.

Table 1 Showing changes in Respiratory rate and pulse rate during phase 1, 2 and 3 in meditators and non-meditators

	Group I Meditators (undergoing Meditation)		Group II Non-Meditators (undergoing Relaxation)	
	Resp. Rate	Pulse rate	Resp. Rate	Pulse rate
Phase 1 Before meditation/Relaxation	11.60 \pm 1.50	78.60 \pm 5.85	11.90 \pm 1.57	77.30 \pm 6.35
Phase 2 during meditation/Relaxation	8.80 \pm 2.99	71.50 \pm 6.64	11.70 \pm 1.46	76.10 \pm 7.00
Phase 3 after meditation/Relaxation	9.20 \pm 2.99	70.70 \pm 5.47	11.70 \pm 1.46	76.10 \pm 7.00
p value (Significance)	$p^* < 0.001$ (HS)	$p^* < 0.001$ (HS)	$p^* > 0.05$ (NS)	$p^* < 0.05$ (S)

NS-not significant, S-significant, HS-Highly significant.

*comparison of 'before' with 'after' the respective procedure.

Significant difference, that is lower pulse rate as well as respiratory rate were observed in the meditators in comparison to the group undergoing relaxation during phase 2 of the respective procedures. Phase 3, that is results seen after the respective procedures too showed significant lower values of pulse rate as well as respiratory rate in the meditator group in comparison to group II.

Table 2 Showing the Comparative effects of meditation and relaxation on respiratory rate and pulse rate in the three different phases.

	Respiratory Rate		Pulse rate	
	Group I (meditation)	Group II (relaxation)	Group I (meditation)	Group II (relaxation)
Phase 1 Before meditation/Relaxation	11.60±1.50	11.90±1.57	78.60±5.85	77.30±6.35
Phase 2 during meditation/Relaxation	8.80±2.99	11.70±1.46	71.50±6.64	76.10±7.00
Phase 3 after meditation/Relaxation	9.20±2.99	11.70±1.46	70.70±5.47	76.10±7.00
p value (Significance)	p* > 0.05(NS) p** < 0.05(S) p*** < 0.05(S)		p* > 0.05(NS) p** < 0.05(S) p*** < 0.05(S)	

NS-not significant, S-significant,

*comparison of group I with group II during phase1.

**comparison of group I with group II during phase2.

***comparison of group I with group II during phase3.

Discussion

Various biophysical parameters are determinants of the status of the health of an individual and are the subjects of interest for clinical research and investigation. Meditation shows to have a strong evidence to modify, regulate and improve many of these biophysical parameters. Out of these parameters respiratory rate currently seems to be the least studied parameter amongst meditators. On the contrary many studies have been done on pulse rate and heart rate to study cardio respiratory status in meditators and other individuals. Findings showing the beneficial effect of meditation by reducing or normalizing the pulse have been replicated in many studies.

R. Schneider in 2006(8) has shown reduction of pulse rate in regular practitioners of meditation.

Khare et al in 2000(11) in a similar study like ours in which pulse rate was measured before, during and after meditation had found pulse rate reduction in the 'during' and 'after' phases of meditation.

S. Terathongkum in 2004(12) too had shown a significant decrease in heart rate in meditators. Similarly S. Maini et al in 2011(13) had studied the effect of rajyoga meditation on heart rate, blood pressure and ECG and had found reduction in heart rate in the meditator group. Vyas et al in 2002(9) in their study had found reduction in pulse rate in both long term and short term meditators, thereby showing the beneficial effect of even short term practice of meditation.

Our study showed statistically significant reduction in pulse rate in the meditator group during and after meditation. These findings were quite consistent with most of the research works conducted by others.

Increased Sympathetic activity is known to increase heart rate and pulse whereas increased parasympathetic activity is known to decrease the heart rate and pulse. Meditation is known to have an autonomic regulating action by activating the parasympathetic nervous system.

The parasympathetic-limbic activation achieved through meditation relaxes us by balancing the two opposing sympathetic functions. (16, 17) This relaxed state in meditation is accompanied by alterations in certain physiological parameters one of which is decrease in pulse rate. (15, 18)

Out of the different physiological parameters the fewer studies done on respiratory rate in the current scenario are worth mentioning.

Khare et al in 2000(11) had found significant fall in respiratory rate in the 'during' and 'after' phases of meditation in their study in which they had used grass model 5 polygraph.

Dudhmal et al in 2004(10) had demonstrated significant reduction in the respiratory rate on comparing 'before' and 'after' values obtained after 10 days of vipassana meditation.

In our present study we found a significantly reduced respiratory rate in the 'during' and 'after' phases of meditation. These findings were quite comparable to the study done by khare et al in 2000.

As mentioned before, meditation is known to cause a hypometabolic effect on the body which leads to a decreased oxygen consumption and also decreased elimination of carbon dioxide. This has a direct effect on reducing the respiratory rate. (3, 4, 14)

Another explanation could perhaps be also cited to the fact that Meditation is known to have an autonomic regulating action by balancing the parasympathetic and sympathetic nervous system in conjunction with the limbic system. This relaxed state obtained due to meditation is accompanied by a decrease in the respiratory rate, which is one of the various physiological parameters that have been shown to change after meditation is introduced to a person. (15, 18)

Conclusion and summary

Thus, we conclude from the present study that meditation causes decrease in both respiratory rate as well as pulse rate and there by the heart rate. This thereby explains that the relaxed state which one experiences subjectively in meditation is in fact accompanied by alterations in various physiological parameters that have been traditionally related to stress. Meditation is

thus more than mere relaxation and thereby an introduction of meditation in our day to day routine should definitely be encouraged to cope up with today's demanding lifestyle and daily stress.

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