

Sympathetic Response In Chronic Tension Headache After Rajyoga Meditation

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Abstract: Background: We aimed to investigate the effect of Rajyoga meditation on autonomic reactivity in chronic tension type headache patients by studying its impact on blood pressure and heart rate. Method: The study was conducted on 50 chronic tension type headache (CTTH) patients, who were on similar analgesics and muscle relaxant drugs. They were randomized into two groups- meditators (n=30; age 32.20 ± 1.88 years) and controls (n=20; age 34.65 ± 11.21 years). The meditators were taught Rajyoga meditation and practised for 20 mins /day, 7 d /week for 8 weeks. The control group did not practice any type of yogic exercises or relaxation techniques. Blood Pressure (BP) and Isometric handgrip (IHG) test were assessed at 0 week and after 8 weeks. Descriptive statistics of the mean, standard deviation were used. The data were analyzed using student 't' test. One way analysis of variance (ANOVA) was applied to find the significance. Result: The basal cardiac parameters viz heart rate and blood pressure were uniformly lower in meditators than non-meditators. On performing isometric handgrip test, non-meditators developed significant increase in blood pressure and heart rate during gripping than that seen in meditators. In meditators significant reduction in SBP, and DBP and HR were found during IHG test after 8 weeks of meditation practices as compared to baseline recording. Conclusion: Rajyoga meditation is effective in reducing BP in resting conditions in CTTH by decreasing the sympathetic reactivity. It is also found to normalize cardiovascular autonomic function in stressful conditions as proved by IHG test results. Rajyoga meditation is the simplest, economical, effective and applicable method that can be adopted by clinicians in CTTH patients as an adjuvant to drugs.

Key Words: Autonomic nervous system, Chronic Tension Type Headache, Rajyoga Meditation.

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Introduction: Tension type headache sometimes referred to as stress headache, is a bilateral, pressure like headache of mild-to-moderate intensity that can last from 30 minutes to 7 days and has only one accompanying symptom (e.g. nausea, vomiting, photophobia or phonophobia)¹. It is the most common type of primary headache and accounted for nearly 90% of all headaches and has been associated with chronic and episodic tension-type headache forms. In episodic Tension Type Headache there are less than 15 and in Chronic Tension Type Headache (CTTH) there are at least 15 attacks per month². The pathogenesis of CTTH is poorly understood. As the condition is mostly associated with the sympathetic nervous system, impaired functioning of sympathetic system is said to be the pathogenesis^{3, 4}.

Poor response of CTTH patients to traditional drug therapies calls for a multidimensional therapeutic approach. Psychosocial and other mind-body approaches and relaxation modalities like diaphragmatic breathing, deep

muscle relaxation, self-hypnosis and autogenic techniques like biofeedback, yoga and meditation offer useful options for reducing stress-related aspects of headache and for managing pain⁵. Spirituality and meditation has established its role in various psychosomatic problems⁶. Meditation produces specific neural activation patterns involving decreased limbic arousal in the brain, which in turn results in reduced stress and increased autonomic stability^{7, 8}. Some scientists have demonstrated the effects of meditation on parameters like Galvanic Skin Resistance (GSR) and EDR only⁹. Various types of meditations like integrative body-mind training (IBMT), Yogic asanas and mindfulness meditation have been used to study their effect on ANS¹⁰⁻¹². This study was done to investigate the effect of Rajyoga meditation on cardiovascular autonomic responses (BP & HR) in CTTH patients using isometric hand grip (IHG) test.

Rajyoga Meditation: It is a behavioral intervention primarily concerned with the mind.

This yoga (yoga of meditation) is associated with the organization of 'Brahmakumaris' and has its headquarters at Mount Abu Rajasthan, India. This organization has its ashrams throughout India and in other countries as well. In this form of meditation the individual sits in a relaxed & comfortable position with their eyes open, and with gaze fixed on a meaningful symbol (a light) & then uses visual or auditory images for concentration. Whenever the mind wanders away, it is brought back to the visual or auditory image, being used quietly & persistently. This helps one to proceed to "dhyana" or meditation¹³. At the same time they actively think positive thoughts about a Universal force pervading all over, as light and peace¹⁴. This technique requires considerable commitment and involves concentrated thinking but is simple to practice.

Material and Method: The present study was carried out in the department of Physiology, Sri Guru Ram Das Institute of Medical Sciences & Research Amritsar, Punjab, India. The protocol of the study was approved by the ethics committee of our institute. Fifty patients of CTTH aged 20-50 years of age were selected for study. CTTH was diagnosed by the criteria laid down by the International Headache Society for Chronic Tension Headache¹. These patients were undergoing treatment for CTTH in the psychiatry department of the same institute. The inclusion criteria was the presence of primary headache with duration more than 4 hrs a day and frequency of 15 or more days monthly for at least 6 months. Patients with headache less than 6 months, post traumatic headaches, headaches due to sinusitis, eyestrain, cervical spondylosis and severe depression were excluded from the study. All the patients were on a similar drug regime of analgesics and muscle relaxants. The methodology of the project and the need for regular follow up was emphasized to them. The subjects were divided into 2 groups, Group A-Meditators (n=30) & Group B -Non-Meditators or controls (n=20). The patients in both the groups were comparable regarding age, sex and social status. There were more females than males and more married people than unmarried

ones in both the groups. Blood pressure (BP) and heart rate (HR) were recorded in all subjects. Blood pressure was recorded using mercury sphygmomanometer (Pagoda, India) and heart rate was measured from the R-R interval of ECG using Lead II of Electrocardiograph machine (WIPRO GE Mac 600). Isometric hand Grip (IHG) Dynamometry was done all the subjects. On a sustained hand grip at 30% of maximum voluntary capacity for 15 sec, HR and BP were recorded just before the release of hand grip. Patients in Group A were taught Rajyoga meditation while Group B was not taught any kind of relaxation therapy. Rajyoga meditation was taught by the author herself who is a brahmakumari & is associated with Prajapita Brahmakumari Ashram, Amritsar for the last 20 years. After 8 weeks of follow up, BP and HR were recorded both in meditators and non-meditators before and during IHG test. The data obtained were subjected to appropriate statistical analysis. All the quantitative parameters between the two groups were compared using Student 't' test. P values detected smaller than 0.05 were considered as significant.

Study Design: Meditation was taught to Group-A subjects in a silent dimly lit room, in batches of 3-4 subjects per batch, between 10-1 pm. The group format increases the efficiency of patient education. Group support enhanced individual motivation and compliance. Meditation training was given with the help of pictures, diagrams and audio cassettes. A total of 8 lessons each of 45 minutes were given. 25 minutes were devoted to instruct them on the meditation technique and 20 minutes for performing meditation with guided commentary. Meditation was presented with the suggestion that this technique is powerful and regular practice can bring relief from pain in many cases. In this way a positive placebo effect was maximized. The Meditators were instructed to perform meditation for 20 minutes each day at their home either in morning or evening and to note about meditation practice in their daily diary. They were also given Brahmakumari's literature on positive thinking. Such material strengthened

the belief that meditation can have significant physiological effects. Eight such sessions, twice a week for 4 weeks, were given followed by once a week interview for next 4 weeks during which the method followed by the patients was checked and any queries relating to the methodology were answered. At this time patient's compliance to practice of meditation was also tested.

Isometric Handgrip Dynamometry: The subject was asked to sit comfortably in chair. Initially the subject was asked to exert maximal hand grip strength on hand grip dynamometer with dominant hand. First the maximum voluntary contraction (MVC) (Maximal isometric tension i.e. T max) is determined and then the subject was asked to exert 30 % of MVC for 3 minutes with dominant hand. The BP and Pulse Rate were measured in the non dominant hand at rest and just before the release of hand grip pressure. Maximum rise in BP and pulse rate during 30 % of MVC over the resting BP and pulse rate was noted. IHG test was repeated for 3 times for the reliability of result & subjective effort. Normal value i.e value of more than 15mmHg rise in diastolic BP is taken as normal. Less than 10 mmHg rise in diastolic BP is taken as sympathetic insufficiency. 10-15 mmHg is considered as borderline¹⁵.

Result: Fifty patients, comparable regarding age, sex, social status and marital status entered the study. 30 in Group A (Meditators) and 20 in Group B(non-meditators or controls). There were more females than males and more married people than unmarried ones in both the groups. The mean age of meditators was 32.20 ± 1.88 and non-meditators was 34.65 ± 11.21. The normal mean Systolic and diastolic BP in Group-A (118.00 ± 10.31 and 79.87 ± 7.70 respectively) was comparable to that of Group-B (117.30 ± 6.69 and 77.00 ± 8.07 respectively). The mean HR of the subjects in both the groups was also statistically non significant, 79.17 ± 9.59 in Group A and 77.20 ± 9.81 in Group B. The mean values of BP and HR readings during IHG in both the groups were statistically non-significant as shown in the table1. After 8 weeks of meditation and follow up of subjects in group

A, the mean value of systolic blood pressure in the meditators was 112.30 ± 7.98 and in the non-meditators, it was 117.00 ± 7.02. The 't' and 'p' values were statistically significant (t=2.195, p=0.033). Similarly, the diastolic BP in the meditators was 75.70 ± 6.27 and it was lower than the values in the non meditators, i.e. 78.87 ± 4.32. Here also 't' and 'p' values were statistically significant (t=2.118, p=0.039). But the difference in mean value of HR recorded in meditators after 8 weeks of meditation (75.87 ± 8.30) and non meditators (78.60 ± 8.46) was non-significant (t=1.132, p=0.263). When IHG test was done in both the groups after 8 weeks, the mean values of systolic BP and HR were statistically significant (p=0.036 and p=0.048 respectively).The difference in the mean value of diastolic BP during IHG between meditators who had practiced Rajyoga meditation for 8 weeks and non-meditators who did not follow any kind of relaxation technique, was highly significant (p<0.001) as depicted in Table 2.

Table 1: Changes in blood pressure and heart rate during IHG test before meditation in both groups

Parameter	Group A (Meditators) (n = 30)	Group B (Non-Meditators) (n = 20)	P value
Normal			
Systolic BP	118.00 ±10.31	117.30 ± 6.69	0.790 ^{NS}
Diastolic BP	79.87 ± 7.70	77.00 ± 8.07	0.212 ^{NS}
Heart Rate	79.17 ± 9.59	77.20 ± 9.81	0.485 ^{NS}
During IHG			
Systolic BP	136.60 ±11.52	132.00 ± 9.79	0.149 ^{NS}
Diastolic BP	95.53 ± 7.77	90.80 ± 9.59	0.061 ^{NS}
Heart Rate	84.73 ± 9.52	82.40 ± 9.79	0.405 ^{NS}

NS- Non Significant, S- Significant, HS- Highly Significant

Table 2: Changes in blood pressure and heart rate during IHG test after meditation in both groups

Parameter	Group A (Meditators) (n = 30)	Group B (Non-Meditators) (n = 20)	P value
Normal			
Systolic BP	112.30 ± 7.98	117.00 ± 7.02	0.033 ^S
Diastolic BP	75.70 ± 6.27	78.87 ± 4.32	0.039 ^S
Heart Rate	75.87 ± 8.30	78.60 ± 8.46	0.263 ^{NS}
During IHG			
Systolic BP	122.53 ± 7.54	128.10 ± 10.69	0.036 ^S
Diastolic BP	82.27 ± 3.81	89.10 ± 8.14	<0.001 ^{HS}
Heart Rate	79.60 ± 8.04	84.50 ± 8.85	0.048 ^S

NS- Non Significant, S- Significant, HS- Highly Significant

Discussion: This study aimed at investigating the effect of Rajyoga on sympathetic reactivity in chronic tension headache patients. The study consisted of two groups; control (CTTH patients on analgesics and muscle relaxant drugs) and meditators (CTTH patients on similar drugs plus Rajyoga meditation). Both study and control groups were comparable in terms of their age, height, weight, resting heart rate and resting blood pressure. The study group showed significant reduction in systolic, diastolic BP in meditators after a short session of 8 weeks of regular practice of Rajyoga meditation. Our results are in agreement with the findings of Patel and North and Blackwell et al^{16, 17}. In our study HR did not show significant reduction after meditation. Similar findings were reported by English and Baker that transcendental meditation reduced blood pressure but did not reduce heart rate¹⁸. Meditation is associated with a blunted sympathetic activity as is shown by a reduction in the heart rate after regular meditation. Similar trends in the heart rate were noted in other studies¹⁹⁻²¹. Non significant change in normal HR in meditators in our study could be attributed to the fact that they had undergone meditation only for a short period of 8 weeks. The control group showed no significant changes in any of these parameters.

During IHG test, the rise in SBP and HR was found to be statistically significantly lower where as DBP showed a highly significant fall in meditators after 8 weeks of meditation than in non-meditators. Variations in DBP are a more sensitive and specific to diagnose autonomic disorders. Our study is in agreement with Desh Deepak et al and Vempati and Telles, that meditation by modifying the state of anxiety reduces the stress induced sympathetic overactivity, resulting in lowering of the diastolic blood pressure and the heart rate. It makes the person relaxed and thus decreases the arterial tone and the peripheral resistance^{22, 23}

Conclusion: It can be concluded that Rajayoga meditation may affect the autonomic activity significantly by reducing sympathetic activity but the effects require a long term continuation of the technique. Changes in autonomic activity might help in reducing psychosomatic disorders and general well being of an individual. This study undoubtedly seems to bridge the path between spiritual and scientific world. The overall effect of Rajyoga meditation is to bring a state of parasympathetic dominance and demonstrates the control over the uncontrollable i.e. Autonomic Nervous System. Further studies are suggested on larger sample size and longer duration of meditation with some more biochemical and stress related variables.

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