RESEARCH ARTICLE

Effect of yogic relaxation practices on reaction time

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ABSTRACT

Background: Asanas or posture practice brings mental stability and fickleness of mind can be also prevented. Studies showed effects of different yoga on reaction time but there is very limited study to show effects of yogic relaxation practices only on reaction time. Aim and Objectives: This study was conducted to find out after effects of yogic relaxation practices on physiological parameters and reaction time comparing it with age matched control group. Materials and Methods: We included 18 participants of age 18–45 years each in yoga group (31.94 ± 7.64) and control group (31.39 ± 6.84). Ethical approval for the study was obtained from the Institute Ethics Committee and All India Institute of Medical Sciences, New Delhi. Data (blood pressure [BP], pulse rate, respiratory rate, visual, and auditory reaction time) were collected before and after 3rd week of yogic relaxation practices (shavasan and makrasan) in yoga group; likewise, data were collected without yogic relaxation practices in control group. Results: The gain score of the studied parameters was negative (<0) for yoga group, but positive (>0) for controls, indicates that yoga intervention resulted reduction in the values of yoga group. Result showed that change in studied parameters due to yoga intervention was statistically significant more in cases of yoga group to the change in control group with exception of RR and pulse rate. Parameters were comparable or similar between the two groups on baseline, we found statistically significant lower values for BP, visual, and auditory reaction time on 3rd week in yoga group. Conclusion: The beneficial effect of reduction in visual and auditory reaction time after practicing yogic relaxation can be applied to training curriculum.

KEY WORDS: Reaction Time; Yoga; Relaxation

INTRODUCTION

Yogic practices are part of Indian culture from ancient times. Yoga practices are also known for improving cognition.[1] Cognitive abilities are part of challenges we face in our busy schedule and various studies show positive effects of yoga on it.[2-5] Effects of yoga practices in neurocognitive and psychology are budding interest in research now a days.[6]

Yogic practices such as shavasan produce psychosomatic relaxation.[7] Shavasan relaxes the body because the muscles are completely relaxed voluntarily. It also relaxes the mind through deep and conscious breathing. A steady asanas or posture produce mental equilibrium and prevent fickleness of mind. Various study shows effectiveness of shavasan in management of stress[8,9] and hypertension.[10,11] Studies show yoga breathing techniques lead to positive effects on cognitive tasks which involved visual and auditory reaction time.[12,13] Study done on combined practice of asanas and pranayamas leads to improvement in motor and sensory nerve conduction...
and reaction time was decreased which signify an alert and yet relaxed state of the neuromuscular system. Study shows pranava pranayama produce great changes on heart rate. In a study, it was observed that Buddhist meditation practices decreases reaction time.

In this study, we investigated the effects of yogic relaxation practices (shavasana and makrasan) on visual and auditory reaction time and on physiological parameters (heart rate, respiratory rate, systolic, and diastolic blood pressure [BP]). The results from this study could correlate effects of yogic relaxation practices on physiological changes and reaction time. Therefore, this study could explain possibilities of applying yogic relaxation practices on daily basis to improve reaction time so that it can help people to give better performance in their work.

MATERIALS AND METHODS

Ethical approval for the study was obtained from the Institute Ethics Committee and All India Institute of Medical Sciences, New Delhi. Thirty-six participants both male and female aged 18–45 years participated in the study. Eighteen participants aged between 18 and 45 years (31.94 ± 7.64) who had not previously used yogic relaxation technique were included in yoga group and similar age matched participants (31.39 ± 6.84) were included in control group. Subjects who have severe cardiovascular, renal, cerebral, mental dysfunction, and critically ill patients were excluded from the study.

Subject’s body weight and height was measured. Yoga group participant’s body mass index (BMI) calculated from height and weight data and recorded in subject data form in somnomedics polysomnographic recording before starting the recording as to record different physiological parameters during yogic relaxation practices in another study of ours. Control group participant’s BMI noted on paper. Baseline BP was measured in both yoga and control group with the help of mercurial BP apparatus. After 3rd week, we measured Systolic blood pressure (SBP) and diastolic blood pressure (DBP) in both group with the same instrument.

Yoga Group

Physiological parameters recorded just before yogic relaxation practice began and after 3 weeks of daily yogic relaxation practices. Subjects practiced yogic relaxation (shavasan for 10 min and maintain makrasan pose) in a day.

Control Group

Physiological parameters recorded on day 1 and after 3 weeks without any yogic relaxation practices or any other intervention.

Yogic Relaxation Technique

Shavasana

Participants were given instruction involving awareness of breath. Shavasana begins with instructing the subject to lie down on the back full length like corpse with hands little away from thighs with palm away and heels together toes apart. To start with subjects were instructed to breathe deeply; later the breathing should be fine and slow with no jerky movements to disturb the spine or the body. Concentrate on deep and fine exhalation, in which, the nostril does not feel the warmth of breath. Lower jaw should hang loose and not be clenched. Tongue should not be disturbed and even the pupil of the eyes should be kept completely passive. Relax completely and breathe out slowly. Practice this relaxation for 10 min.

Makrasan

Subjects were instructed to lie flat on your stomach, raise head, and shoulder. Place the hand in front with elbows resting on the ground and rest your head on the palm of your hands. Close eyes and maintain awareness of own breathing process. Maintain this pose.

Reaction time

The reaction time test was done on audio visual reaction timer. The timer has two sides, the investigator’s side and subject’s side. Each side has a set of five switches and five light-emitting diodes. In addition, the observer’s side has a two-way switch, a reset switch, and a display unit. The two-way switch can be kept at “Sound” for presenting an auditory signal or can be kept at “Light” for presenting a visual signal to the subject. A board between the investigator and the subject side prevents the subject to see the observer’s side and hand movements. The display unit shows time. A reset switch is provided for resetting the timer.

Visual reaction time

Instruction was given to the subject to press the stop switch as soon as subject perceives the visual signal. Keeping the two way switch on “Light” side and then gave the stimulus by one of the five start switches which simultaneously start the timer. When the subject responds to the signal by pressing the switch, the timer stops. The reading was noted and then reset the timer to zero before taking the next reading.

Auditory reaction time similarly, instead of light auditory signal can be given by keeping the two-way switch on “Sound” side.

Statistical Analysis

The data were analyzed using Statistical Package for the Social Sciences version 20. Normality testing was done using Shapiro–Wilk test and Kolmogorov–Smirnov test. Normality distributed parameters were presented in Mean ±
Standard deviation, others in Median ± Quartile deviation. Comparison of studied parameters between the yoga and the control group at baseline, 3rd week was done using unpaired t-test for normally distributed data, while Mann–Whitney U test was used for others [Table 1]. Similar comparison of gain score was done between yoga and control group, where gain score was calculated as 3rd week value minus 1st day value [Table 1]. Comparison of 1st day parameters with that of 3rd week was also done among case and control as within the group analysis, using paired t-test and Wilcoxon signed ranks test as parametric and non-parametric test, respectively [Table 2]. Statistically significant was set at $P < 0.05$.

RESULTS

The gain score of the studied parameters was negative ($<0$) for yoga group, but positive ($>0$) for controls, indicates that the yoga intervention resulted in reduction in the values in case of yoga group (Table 1 represents comparison of the studied parameters between case and control). Neglecting the direction of change (negative sign), our result showed that the change in the studied parameters due to yoga intervention was statistically significant more in cases of yoga group to the change in control group with exception of RR and pulse rate, indicating the effectiveness of yoga intervention on those parameters [Table 1]. Although all the studied parameters were comparable or similar between the two groups on baseline, we found statistically significant lower values for SBP, DBP, V-RT, and A-RT on 3rd week [Table 1] in yoga group, again an indication of effectiveness of yoga intervention.

Furthermore, among the cases of yoga group, the values of BMI, SBP, DBP, V-RT, and A-RT became statistically lower on 3rd week than the baseline (Table 2 represents comparison of studied parameters between 1st day and 3rd week in case and controls). Although, with time, even without yoga, also control group’s pulse rate, SBP, and DBP become lower in 3rd week, which may be just a coincidental finding [Table 2].

DISCUSSION

The study result showed that change in the studied parameters due to yoga intervention was statistically significant more in cases of yoga group to the change in control group with exception of RR and pulse rate, indicating the effectiveness of yoga intervention on those parameters. We observed statistically significant lower values for SBP, DBP, V-RT, and A-RT on 3rd week in yoga group. In control group, also pulse rate, SBP, and DBP become lower in 3rd week.
Table 2: Comparison of studied parameters between 1st day and 3rd week in case and controls

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Case, n=18 (Mean±SD)</th>
<th>P-value</th>
<th>Control, n=18 (Mean±SD)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st day</td>
<td>3rd week</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3rd week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>31.94±7.64</td>
<td>-</td>
<td>31.39±6.84</td>
<td>-</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>25.85±1.12</td>
<td>25.00±0.88</td>
<td>0.001***</td>
<td>25.00±1.00</td>
</tr>
<tr>
<td>RR (per minute)</td>
<td>14.75±3.09</td>
<td>14.00±1.00</td>
<td>0.888*</td>
<td>16.00±2.00</td>
</tr>
<tr>
<td>Pulse rate (per minute)</td>
<td>71.17±10.16</td>
<td>68.89±4.71</td>
<td>0.120</td>
<td>71.56±4.88</td>
</tr>
<tr>
<td>SBP (mmHg)</td>
<td>131.00±4.00</td>
<td>128.00±2.25</td>
<td>&lt;0.001***</td>
<td>134.00±4.25</td>
</tr>
<tr>
<td>DBP (mmHg)</td>
<td>86.00±2.00</td>
<td>82.00±1.00</td>
<td>&lt;0.001***</td>
<td>84.00±2.17</td>
</tr>
<tr>
<td>V-RT (milliseconds)</td>
<td>238.56±7.82</td>
<td>205.56±12.82</td>
<td>&lt;0.001**</td>
<td>240.00±5.37</td>
</tr>
<tr>
<td>A-RT (milliseconds)</td>
<td>200.00±8.12</td>
<td>167.50±11.25</td>
<td>&lt;0.001***</td>
<td>205.00±10.00</td>
</tr>
</tbody>
</table>

Paired t-test, Wilcoxon Signed Ranks Test and MedianMedian±QD (quartile deviation).*P<0.05, **P<0.01, BMI: Body mass index, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, SD: Standard deviation

Trakroo et al. observed that there was a post-training decrease in RT in all the yoga groups and this was significant for V-RT in asana group, A-RT in pranayama group, and V-RT as well as A-RT in the asana-pranayama group but there is no significant change in control group.[14] In our study, also we got similar results as significant lower values of V-RT and A-RT in yoga group in 3rd week as compared to 1st day while in control group no significant change observed. Sudsuang et al. observed in their study that effect of Buddhist meditation on reaction time after 3 weeks and 6 weeks leading to larger percentage decreases in reaction time in experimental group though there is reduction of reaction time in control group also.[15] Our study also shows similar observation on reaction time in yoga group though yogic relaxation practices are different from meditation and unlike their study; we observed no significant change in reaction time in control group. In our study, SBP and DBP are also lower in 3rd week in yoga group that is more significant statistically in comparison to control group which is not similar observation to the study by Sudsuang et al., in which, control subjects showed no decline. There is limited study on effect of yoga-based relaxation practices on reaction time. Sarang et al. compared in their study the effects of yoga-based relaxation technique on six letter cancellation task with control group and observed significant increase in total and net score after yoga-based relaxation techniques but there is no significant change in control group.[16] Similarly, our results show beneficial effect as decline in reaction time after yogic relaxation practices. Similar to our study result, another study compared effect of bellows-type breathing and breath awareness on reaction time with control group and they found significant decrease in anticipatory response in yoga group.[12] Kurwale et al. observed improvement in cardiorespiratory parameters (pulse rate, respiratory rate, and BP) and visual reaction time in working women after yogic exercises combined practices of asana, breathing exercises, meditation, and relaxation technique in a sequence.[18] Similar findings observed in our study, though specifically we had not observed in women only but all the participants in our study were also working person in different field. Pulse rate and BP findings reduced in both control and yoga group in our study but gain score of parameters (SBP, DBP, V-RT, and A-RT) showed more significant changes in yoga group to the change in control group.

The limitation in our results is that inclusion of other electrophysiological tests in all participants could give better understanding of effects of physiological changes after yoga relaxation practices. Physiological parameters such as SPO2, electroencephalogram, and electrocardiography which we studied with the help of polysomnography instrument to observe physiological changes during yoga relaxation practices in our another study.[17] Our inability to include other electrophysiological parameters after 3rd week in yoga group and control group in this study due to time consuming nature of physiological tests like polysomnography study, so unable to observe complete picture of effects of relaxation practices after 3rd week in comparison to control group. As mechanism in the beneficial findings are not clear, so further investigation can be done with long-term follow-up.

CONCLUSION

The beneficial effect of reduction in visual and auditory reaction time after practicing yogic relaxation can be applied to improve the personality of human being into a better one. Yogic relaxation practices can be recommended to curriculum of various professional training.

REFERENCES

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