Abstract

This piece of work was to design to uncover the effect of Pranayama on selected psychomotor abilities. Thirty self-reported good health male B.P.Ed Part-I students of LNIPE, Gwalior of 17-22 years age group were divided on the basis Scaling/ equated method in two groups i.e. yoga group and control group to test the effect of Bhashrika pranayama on selected psychomotor abilities like weight perception, depth perception and anticipation. The yoga group was imparted thirty minute of daily training of Bhashrika pranayama for six weeks while control group did not perform any yogic activity during this period. All psychomotor measures recorded as pre and post-test on both the groups. The results of the study showed that there was a significant difference between the experimental and control groups. The experimental group showed a significant improvement in depth perception. On the basis of the data scores it may be stated that the experimental group inducted improvement due to involvement in systematic six weeks training of bhashrika pranayama. On the basis of the study it may also be considered that bhashrika pranayama practices could be used for improving perception ability.

1. Introduction

Yoga asanas and pranayam has been proven different types of physical-mental activities effectively. It is the soul-mind-body approach to precise livelihood. Yog is the way to healthy living from ancient Indian culture to modern age [1]. Yoga is defined as a practice consisting of three components: gentle stretching; exercises for breath control; and meditation as a mind-body intervention [2]. Since last few decades, yogic activities have been fascinating researchers to
explore therapeutic rationales for contemporary hypo-kinetic epidemics like mental syndrome, emotional imbalance, physical ailments and so on. Taneja [3] concluded that practice of yoga is beneficial for all the dimensions of health; however, these studies have used only yoga asana, pranayama, and/ or short periods of meditation for therapeutic purposes. General perception about yoga is also the same, which is not correct. Actually Yog is the inclusive way of life. Shivananda Yog Centre [4] explained that out of four types of Path of Yoga (Karma, Jnana, Bhakti and Raj Yog), Raj Yog (psychological approach) lay down a Sutras based on practical system of concentration and control of mind provides an eight stepped (Ashtanga- Yamas, Niyamas, Asanas, Pranayams, Prayahara, Dharana, Dhyan and Samadhi).

The traditional wisdom of yoga, pranayama is the key to bringing about psychosomatic integration and harmony [5]. Pranayama has the capacity of freeing the mind from untruthfulness, ignorance and all other painful and unpleasant experiences of the body and mind /6/. Svavamavama Suri [7] recognized eight varieties of pranayama and Bhastrika is one of those. This pranayama is called bhastrika because it is characterized by increased and quick expulsions of breath [8].

Pranayama exercise practices involve the use of various cortical mechanisms and corticofugal control processes that may alter the process of information processing at the level of the brain steam [9]. If the respiration is made deeper the pressure changes become considerable and under particular circumstances these changes are observed to be remarkably great [10]. Yog has been proven effective at improving your memory and concentration. For instance, Dharana, otherwise known as the practice of concentration, is the perfect way to clear your mind and calm your senses. As you remove the static noise in your head and focus your mind, you’ll find that you’re able to remember things, concentrate, and perform much better [11].

Psychomotor variables act as the medium for the realization of cognitive and affective domains of learning and motor behavior. Performance of motor skills involves neural, physiological and psychological aspects and is a continuum that runs the gamut from physical to cognitive and there is always integration between these aspects of human behavior [12]. Psychomotor fitness of an individual is a perfect blending of physical as well as motor fitness and goes a long way in fielding the excellent outcomes [13]. According to Singer [14] perceptual ability is defined as of or relating to muscular action believed to ensure from prior especially conscious mental activity. Perception includes the receiving and processing of information. The organized information is sent to the higher brain center to be stored until is needed. For the perceptual mechanism to work properly, the receptors must efficiently receiver the information. Athletes receive information by means of sensory receptors in the human body that can be used to receive information exteriorceptors, interlocutors, proprioceptors and distance receptors [15]. Anticipation is the concept of an agent making decision based prediction, expectation or believes [16].

Yoga has been proven effective way to enhancing memory, concentration and mental wellbeing. Yoga appears to provide a comparable improvement in stress, anxiety and health status [17]. Several studies have been conducted to investigate how effective yoga is to the health of the human brain and some outstanding feedback has come out. Harinath et al [18] described very well that yogic practices can be used as psycho-physiologic stimuli to increase endogenous secretion of melatonin, which in turn, might be responsible for improved sense of well-being. Mostly studies were related to effect or relationship of pranayam/ yogic activities with physiological [19-23] and psychological [24-27] aspects.
Yoga asanas and pranayam has been proven different types of mental activities effectively. Plethora of work has been done to assess the effectiveness of pranayama for brain and mental health. The factors of strength, power, stamina, flexibility, co-ordination and balance constituted the physical proficiency whereas the reaction time, speed of movement (response time) arm hand steadiness, visual perception, manual dexterity and rate control were the abilities considered under psychophysiological or psychomotor area [28].

However effect of Pranayama on perception and anticipation is little to prove. However, to the best of our knowledge, there is no systematic study quantifying modulation of effect of Pranayam on perception. Hence, the present study was conducted to find the effect of Bhashtrika Pranayam on selected psychomotor abilities.

2. Methodology

2.1 Settings and Design

Total thirty self-reported good health male B.P.Ed Part-I students of LNIPE, Gwalior in the age group of 17-22 years were participants to test the effect of Bhashtlika Pranayama on selected psychomotor abilities.

Scaling/ equated group design is chosen to enhance the interpretability of scores by incorporate useful information into the score scale so as to avoid misleading interpretations. For this participants were grouped into ‘control’ and ‘experimental’ on the basis of equating their pre test performance on all selected psychomotor ability. First the participants were arranged in descending order on the basis of their rank of pre-test performance. Then alternately participants were assigned to two groups. Finally the equated groups were checked again by comparing their mean performance.

At the commencement of the studies they were subjected to routine clinical examination and found to be healthy and free from disease.

2.2 Selection of Variables

The selection of the variable was based mainly on very purpose of study and those perceptual variable which shows significant relationship with movement concept understanding. The Depth Perception, Weight Perception and Anticipation Ability chosen were as variables presented in Table 1.

<table>
<thead>
<tr>
<th>SI. No.</th>
<th>Variables</th>
<th>Test</th>
<th>Criterion Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Depth perception</td>
<td>Depth perception Box</td>
<td>Centimeter</td>
</tr>
<tr>
<td>2.</td>
<td>Weight perception</td>
<td>Weight perception Box</td>
<td>Grams</td>
</tr>
<tr>
<td>3.</td>
<td>Anticipation Ability</td>
<td>L.E.D. Light Visual Anticipation apparatus</td>
<td>Seconds</td>
</tr>
</tbody>
</table>

2.3 Procedure

The experimental group was imparted thirty minute of daily training of Bhashtrika pranayama for six weeks under the proper supervision and guidance of the scholar while no training was imparted to control group. At the end of six week post test was conducted for both the groups for the following criterion measures:
2.3.1 Bhastrika Pranayama

In Sanskrit Bhastrika means ‘bellows’. Rapid succession of forcible expulsion is a characteristic feature of Bhastrika. Just as a blacksmith blows his bellows rapidly, so also you should move your breath rapidly. Bhastrika is a powerful exercise. A combination of Kapalabhati and Ujjayi makes up Bhastrika. Practise Kapalabhati and Ujjayi to start with. Then you will find it very easy to do Bhastrika.

Close the mouth. Next, inhale and exhale quickly ten times like the bellows of the blacksmith. Constantly dilate and contract. When you practise this Pranayama a hissing sound is produced. The practitioner should start with rapid expulsions of breath following one another in rapid succession. When the required number of expulsions, say ten for a round, is finished, the final expulsion is followed by a deepest possible inhalation. The breath is suspended as long as it could be done with comfort. Then deepest possible exhalation is done very slowly. The end of this deep exhalation completes one round of Bhastrika.

2.3.2 Technique of Bhastrika Pranayama

Sit in a Padmasan or in any other meditative posture with straight back and closed eyes. Inhale by expanding the chest and now exhale by contracting the abdomen so that the chest remains expanded and elevated. Every round of Bhastrika Pranayama has got two pars. First span consists of 20 to 30 stroke of Kapalbhati and second spell contains Puraka, Kumbhaka and Rechaka phase.

2.3.2.1 Kapalbhati

Kapalbhati was done through the both nostrils. Every rechaka was done forcefully and rapidly. There a friction sound like 'ss1 is produced with every rechaka. Puraka is passively done though it was also quick. Immediately after Kapalbhati pan puraka was done through both nostrils followed by Kumbhaka for a proportionate time. All these three bandhas viz. Jalandhara, Uddiyan and Mool bandha are applied. To end kumbhaka phase, rechaka phase was done through the both nostril. After releasing bandhas in the same order giving double time than puraka.

2.3.2.2 Puraka

In puraka phase a deep inspiration of air were take place.

2.3.2.3 Kumbhaka

In Kumbhaka phase the subject were retained the breath through applying bandhas till the subject feel comfortable.

2.3.2.4 Rechaka

In this phase the subject were exhaled out the air. The end of deep rechaka completes one round of bhastrika pranayamas.

2.4 Statistical Technique for Analysis of Data

In order to study the effect of bhastrika pranayama on depth perception on both group participants, t test was used and 0.05 level of significance was chosen to test the hypothesis.

3. Results

To find out the significant mean difference between the initial and final scores of depth perception for the experimental and control group ‘t’ test were administered after the experimental period of six weeks practice of Bhastrika pranayama.

The mean difference of the criterion measures for control and experimental groups are presented in table 3.1 to 3.3 followed by figure 3.1 to 3.3.
Table 3.1: Significance of Difference between Pre and Post Test Means of Experimental Group and Control Group in Weight Perception

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre Test Mean</th>
<th>Post Test Mean</th>
<th>DM</th>
<th>σDM</th>
<th>‘t’ Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>12.86</td>
<td>10.2</td>
<td>2.66</td>
<td>1.49</td>
<td>6.904*</td>
</tr>
<tr>
<td>Control</td>
<td>12.93</td>
<td>13.06</td>
<td>-0.13</td>
<td>1.35</td>
<td>0.381</td>
</tr>
</tbody>
</table>

*Significant at .05 level of confidence (t_{0.05} (29) = 2.05)

Figure 3.1: Pre and Post Test Means of Experimental Group and Control Group in Weight Perception

It was showed from table 3.1 that the experimental group found significant difference in weight perception (experimental group t = 6.904*). But no significant difference were observed in control group t = 0.381) in weight perception after 6 weeks practice of Bhaustrika pranayama.

Table 3.2: Significance of Difference between Pre and Post Test Means of Experimental Group and Control Group in Depth Perception

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre Test Mean</th>
<th>Post Test Mean</th>
<th>DM</th>
<th>σDM</th>
<th>‘t’ Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>2.41</td>
<td>1.78</td>
<td>0.62</td>
<td>0.179</td>
<td>13.54*</td>
</tr>
<tr>
<td>Control</td>
<td>2.40</td>
<td>2.38</td>
<td>0.02</td>
<td>0.096</td>
<td>0.269</td>
</tr>
</tbody>
</table>

*Significant at .05 level of confidence (t_{0.05} (29) = 2.05)

Figure 3.2: Pre and Post Test Means of Experimental Group and Control Group in Depth Perception
It was evident from table 3.2 that the experimental group showed significant difference in depth perception (experimental group t = 13.54*). But no significant difference were observed in control group t = 0.269) in Depth perception after 6 weeks practice of bhastra pranayama.

Table 3.3: Significance of Difference between Pre and Post Test Means of Experimental Group and Control Group in Anticipation Ability

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre Test Mean</th>
<th>Post Test Mean</th>
<th>DM</th>
<th>σ DM</th>
<th>‘t’ Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>2.15</td>
<td>0.136</td>
<td>2.01</td>
<td>0.077</td>
<td>10.316*</td>
</tr>
<tr>
<td>Control</td>
<td>2.162</td>
<td>2.179</td>
<td>-0.017</td>
<td>0.0388</td>
<td>1.763</td>
</tr>
</tbody>
</table>

*Significant at .05 level of confidence (t .05 (29) = 2.05)

Table 3.3 was clearly showed that the experimental group showed significant difference in anticipation (experimental group t = 10.316*). But no significant difference were observed in control group t = 1.763) in anticipation ability after 6 weeks practice of Bhastrika pranayama.

4. Discussion of Findings

The results of the study showed that there was a significant difference between the experimental group and control group. The experimental group showed a critical improvement in all the selected psychomotor abilities (depth perception, weight perception and anticipation). The experimental group may be inducted improvement due to involvement in systematic six weeks training of Bhastrika Pranayama. But the control group did not showed any improvement in selected psychomotor abilities the reason was the control was not engaged in any systematic yogic practices. Literature on yoga and our previous studies indicated improvement in various psychomotor and cognitive functions by yogic exercises [5, 25 & 29]. So to assess this aspect, objective tests of measuring concentration, learning, memory, arithmetic ability, vigilance, perceptual efficiency and reaction time were conducted. According to Ray et al [29] that there was improvement in various psychological parameters like reduction in anxiety and depression and a better mental function after yogic practices. Trakroo [30] that conducted a combination of Asan and Pranayama training for 6 months produced an improvement in motor and sensory nerve conduction and concluded that total
power of EEG, alpha and theta power as well as delta % increased, while reaction time decreased signifying an alert and yet relaxed state of the neuromuscular system. Sharma et al [5] observed a significant reduction in perceived stress and improvement in the following cognitive domains: attention, visual–motor speed and memory retention capacity in both fast and slow pranayama groups and concluded that shortening of auditory and visual RT in our pranayama groups represents greater arousal, better concentration and faster responsiveness [31]. The findings of the present study showed that bhastrika pranayama is able to influence systems and secure their efficient and harmonious working. The nerves and muscles are toned up continued to maintain for a considerable long duration. So the coordination among the various functions is brought by the nervous system and other system of our body through the practice central nervous system and automatic nervous system were the optimized so with the help of 6 week of bhastrika pranayama practice experimental group has improved psychomotor abilities likewise depth perception, ability weight, perception ability and anticipation ability.

5. Conclusions
It was concluded that bhastrika pranayama practice have significantly contributed to psychomotor ability mainly depth perception, weight perception and anticipation. On the basis of the study it may also be considered that bhastrika pranayama practices could be used for training physical educational professional for improving psychomotor abilities. Further well conducted research is required which may be most prolific if focused on psychomotor abilities.

6. References
The first author of the paper Dr Archana Chahal has got more than 17 years of teaching experience at Under and Post Graduate level. She has also served as the Head of the Department of Physical Education in OXFORD OF EAST –University of Allahabad for seven years. She held Top Ranked in Entrance Exam; Medalist in Graduate and Post Graduate courses in Physical Education from Asia’s biggest residential and prestigious Banaras Hindu University. She was awarded PhD with Junior Research Fellowship (JRF). She was also secured two Distinction Awards in her Two years Regular Coaching Diploma in Sports and Sports Sciences (Basketball) from esteemed National Institute of Sports, Patiala. She has got much Administrative Work Experience as chairmain and member of different University and National level bodies. She was served as Chief Coach of Uttar Pradesh Basketball Girls Team. She participated and presented various Research papers, Talks in different National and International Conferences/ Seminars/ Workshops/Symposia. She was represented Country and contribute her work in 12th International Commonwealth Sports Conference held at Manchester Metropolitan University, Manchester U.K. – 2002 and Visit to Prof Tom Reilly’s Research Lab, John Moors Liverpool University, U.K. She wrote a book entitled “TALENT IDENTIFICATION IN BASKETBALL”. Her research papers have published in assorted Refereed /distinguish International and
National Journals. She guided various Dissertations and energetically doing research work/ Project to strengthen Sports and Physical Education.

Second Author- Virendra Singh- Research Scholar, Department of Physical Education, AMU, Aligarh. He completed his graduation and post-graduation from University of Allahabad and LNIPE, Gwalior respectively. He is submitted his research work on Arjun Award Winner Abhinshyam Gupta- A wonder boy of Badminton under the supervision in Dr B.B.Singh. Ass Professor, AMU, Aligarh.