International Journal of Movement Education and Social Science
IJMESS Vol. 6 Issue 2 (Oct 2017 www.ijmess.org
ISSN (Print): 2278-0793
ISSN (Online): 2321-3779

EFFECT OF PRANAYAMA ON REACTION TIME OF SPRINTER

(Received on: 28 June 2017, Reviewed on: 29 Aug 2017 and Accepted on: 11 Sep 2017)

Dr. Sambhu Prasad, Assistant Porfessor,
Dept. of Physical Education, Rajiv Gandhi University, Arunachal Pradesh, India
Dr. Tushar Kanti Bera, Former Director of Research,
Kaivalyadhama Yoga Institute, Lonavla, Maharashtra, India.

ABSTRACT

Visual reaction time amongst athletes is mainly concerned with how fast an athlete reacts to a visual stimulus. Reaction time is the ability to respond quickly to a stimulus. It important in many sports and day to day activities. This study aimed to examine the effect of pranayama on reaction time of sprinter. An experimental study was carried out on thirty (n=30), male national level sprinter of Jharkhand state and the age ranged 16 to 18 years. Reaction time was measured by Audio-Visual Reaction Time apparatus. Descriptive statistics had been applied to process the data prior to employing inferential statistics. The inferential statistics employed was repeated measures ANOVA. Further, Newman-Kuels post hoc test was employed to record comparative effects of pranayama practices on reaction time. It can be concluded that the effect of pranayam has positive effect on reaction time of sprinter.

Keywords: Sprinters, Audio reaction time, Pranayam and Yoga

INTRODUCTION

Athletes who are involved in sports should have some advantages in their motor skills. These skills are to be improved by training. Visual reaction time amongst athletes is mainly concerned with how fast an athlete reacts to a visual stimulus. Reaction time is the ability to respond quickly to a stimulus. It important in many sports and day to day activities, Simple reaction time is the time taken between a stimulus and movement e.g., sprint start. For athletics and specifically sprint athletes reaction times and overall sprint time have improved dramatically. Reaction time is the time it takes for a person presented with a stimulus until the initiation of a motor response to the stimulus (Wong et al., 2015). Reaction time in athletics presently includes the time for the stimulus to reach the athlete, the time the athletes takes to respond to the stimulus and the measurement by different starting blocks to register the reaction time (Mero et al., 1992), although a more accurate term for this time is response-time (RT) (Brosnan, Hayes & Harrison, 2017). With increased awareness and interest in health and natural remedies, yogic techniques including pranayama are gaining importance and becoming increasingly acceptable to the scientific community. Pranayama literally means control of prana. Prana, in Indian philosophy, refers to all forms of energy in the universe. Life force is one part of this Pranayama: cardiopulmonary and higher brain functions energy. Life force in an individual is symbolized by breathing. That is why pranayama is generally considered to mean regulated breathing. A yogi, through pranayama, can, at some stages, control other functions of his body and finally control manifestations of prana even outside his body (Bijlani, 2004). As a technique, pranayama can assume rather complex forms of breathing, but the essence of the practice is slow and deep breathing. Such breathing is economical

ISSN (Print): 2278-0793
ISSN (Online): 2321-3779

because it reduces dead space ventilation. It also refreshes air throughout the lungs, in contrast with shallow breathing that refreshes air only at the base of the lungs (Bijlani, 2004). Pranayama breathing has been shown to alter autonomic activity. A study by Udupa et al., (1975) indicates that pranayama training produces a decrease in basal sympathetic tone. Raghuraj et al., (1998) have reported that Nadi-shodhana pranayama increases parasympathetic activity. Slow and deep breathing itself has a calming effect on the mind and helps an individual to de-stress (Sandeep et al., 2002). This calming effect may also exert profound physiological effects on pulmonary, cardiovascular, and mental functions of the brain. Sprinters demands frequent and prolonged good reaction time, Sports like events in track & Field require maximum reaction time. This sport is as much a matter of positioning the body as that of the mind. As the athlete is required to hold the breath while performing, the pre-competitive anxiety, a normal phenomenon, associated with increased breath-rate further hampers the breath-holding capacity of an athlete. Thus breathe control and reacting time plays an important role in successful sprinting performance. By controlling the act of breathing, one can efficiently control all the various motions in the body and the different nerve currents that are running through the body. So more the control over breath more is the steadiness of mind and better is the performance.

METHODOLOGY

The investigator made sure that the entire subjects were ready to go through the experimental requirements of this research. The investigator explained in details about the significance of this research to the participating athletes. The population of this study was state level 100m & 200m sprinters of Jharkhand state. In reality, since this population in Jharkhand was very large, the study was delimited to thirty male players (n=30) and the age ranged 16 to 18 years. All the selected subjects were then again randomly assigned into two equal groups, viz., Group A; (Control; n1= 15) and Group B; (Experimental; n2 = 15). This was, in fact, a parallel group design.

Experimental Design

The design of the experiment has been planned in five phases: Phase – I : Pretest, Phase – II : Control, Phase – III: Test 1, Phase –IV : Pranayama and Phase - V: Post test

Pre Test (Phase –I)

As the purpose of this study was to measure audio-visual reaction time (RTM-606) of state level 100m sprinter, standard tests were administered for this purpose.

Sprint Practice Session (Phase – II)

After the pre testing was over, the entire subject underwent a one and half month (6 weeks) as usual regular sprint practice daily one hour in the afternoon, except Sundays and holidays. No Pranayama practice was given in this session.

Pre Test 1 (Phase –III)

After the completion of sprinting practice session of six weeks again the subjects were undergone for a testing procedure of the audio-visual reaction time (RTM-606).

Treatment session (Phase- IV)

During the treatment or training session, the subjects underwent special training programme of Pranayama practice plus sprinting training. The Pranayama practice was given for one hour in the morning and sprinting training practice for one hour in the afternoon except Sunday and holidays during the total period of experiment for six weeks.

Although the dominant intervention was pranayama, some of the asanas were incorporated in the schedule because as per

ISSN (Print): 2278-0793
ISSN (Online): 2321-3779

traditional text asanas are mandatory prior to pranayamas. All this contents were selected on the basis of various reports on yoga and sports and also based on suggestions from the experts of Kaivalyadhama Yoga Research Institution, Kaivalyadhama, Lonavla. However, following training was imparted to the subjects for total period of six weeks.

Post Test (Phase V)

Finally, when the treatment or training period of 6 weeks was over the post test on reaction time was conducted for all the subjects.

Dependent Variables

Before and after experiment Audio Visual Reaction Time was conducted with the help of Reaction Time Apparatus.

Independent Variables

One independent variable viz, pranayama training was included in this study.

Statistics

Descriptive statistics have been applied to process the data prior to employing inferential statistics. Since the experiment was conducted for a single group and the research design was single group design, repeated measures ANOVA was used as inferential statistics. Further, Newman-Kuels post hoc test was employed to record comparative effects of pranayama practices on the variables.

RESULT

The result of central tendency and dispersion revealed that the mean pretest score of control group in Reaction time test (m.sec.) was 0.215 (± 0.024), whereas mean posttest score was 0.196 (± 0.024).

The mean pretest score of experimental group in Reaction time test (m.sec.) was 0.215 (± 0.024), whereas mean posttest score was 0.120 (± 0.024). Such results indicate that control group only might have helped to improve the performance in Reaction time in reducing the time span (Table 2.1). However, appearance of such result was further confirmed by employing inferential statistics.

Table 2
Results of Descriptive Data on Reaction Time of Sprinter Participated in Experimental Group

Group	Pre-test (M±SD)	Mid-test (M±SD)	Post-test (M±SD)
Control	0.215 (± 0.024)	0.201 (± 0.024)	0.196 (± 0.024)
Experimental	0.215 (± 0.024)	0.198 (± 0.024)	0.120 (± 0.024)

The results of inferential statistics i.e., Repeated measures ANOVA (Table 2) revealed that the variables got remarkably significant changes. In fact, statistically significant changes are evident in case of the selected variables (F=86.15, p<0.01). It seems all the training interventions had statistically significant effects. These changes, therefore, have been discriminated further by using Scheffe's post hoc test.

Table 2
Result of Repeated Measures ANOVA

Source of Variation	SS	df	MS	F ratio
Between Subjects	140.34	29	--	--
Within Subjects	1985.18	60	--	--
TOTAL	2125.52	89		
Treatments (Control and Experimental group)	1485.22	2	742.61	86.15**
Residual	499.96	58	8.62	
* p < 0.05 ** p < 0.01				

The ordered treatment mean scores in Reaction time test (m.sec.) indicates that adjusted mean scores in Reaction time in pre-test among Control group and Experimental group were 0.211 and 0.195 respectively (Table 2.1). The treatment mean scores in post-test among Control group and Experimental group were 0.195 and 0.118 respectively (Table 2.3). Further, the comparative result of Newman-Kuels post hoc test indicates the following results (Table 2.2):

ISSN (Print): 2278-0793
ISSN (Online): 2321-3779

Sprinting training alone helped to reduce Reaction time ($q=4.47$, $p<0.05$), which is statistically significant at the 0.05 level.
Sprinting plus Pranayama training also helped to reduce Reaction time ($q=12.06$, $p<0.01$), which is statistically significant at the 0.01 level.
Effect of sprint plus Pranayama training was superior to control group in reducing Reaction time ($q=9.18$, $p<0.01$), which is statistically significant at the 0.01 level (Fig.4.2).
Thus, the result revealed that the training interventions (i.e., Pranayama) could reduce Reaction time that in turn indicates the improvement in ability to react against signal at starting in sprinting event. Thus, additional inclusion of Pranayama contributes to enhance better level of Reaction ability, which is essentially required for a sprinter.

Table 2.1
Ordered Treatment Means of Reaction time
(Control Group Vs Experimental Group)

Groups	Means
Pre-test Score of Control group	0.211
Post-test Score of Control group.	0.195
Pre-test Score of Experimental group	0.195
Post-test Score of Experimental group	0.118

Table 2.2
Difference between pairs or ordered means on Newman-Kuels post hoc test in Reaction time

Groups	Pretest of Experimental group	Posttest of Control group	Pretest of Control group
Posttest of Experimental group	12.06**	8.73*	13.11**
Pretest of Experimental group	--	2.07	1.79
Posttest of Control group		--	4.47*
* p<0.05, ** p<0.01			

DISCUSSION OF RESULTS

In this present investigation, the researcher has considered sprinting event and determined the impact of pranayama, a controlled breathing exercise as prescribed in Indian traditional texts. The availability of the sprinters, especially at state level is very less and therefore the investigator approached to the SAI centre in Jharkhand. Since the number of sprinter at this state level was very less, the researcher had to consider a single group design for this investigation. In the case of reaction time, the influence of pranayama training was found tremendously effective. Since the subjects as participated in this study were the sprinters, proper timing in starting the competition is highly significant and for this one must have a better neuromuscular coordination. Reaction time is known as the span of time (m.sec.) our muscle acts movements after receiving neural signal. If the span of such is less, better the neuromuscular coordination and this leads to better starting ability in crouch start that leads to better performance in sprinting events. The result of this study indicates that pranayama was found effective in reducing the span of reaction time that in turn improves better reaction ability among the sprinters.

CONCLUSION

To summarize, the result as discussed above indicates that coaches must include pranayama in their training schedule for reducing reaction time which are indeed helpful to exhibit higher performance in sprinting events.

REFERENCES:

B. Sandeep, U. S. Pandey, and N. S. Verma, Improvement in oxidative status with yogic breathing in young healthy males, Indian Journal of Physiology and Pharmacology, 46, 349-354, 2002
K. N. Udupa, R. H. Singh, and R. M. Settiwar, Studies on the effect of some yogic breathing exercises (pranayama) in

ISSN (Print): 2278-0793
ISSN (Online): 2321-3779

normal persons, Indian Journal of Medical Research, 63, 1062-1065, 1975

Lindholm, P., and Gennser, M. Aggravated hypoxia during breath-holds after prolonged exercise. European Journal of Applied Physiology, 93, 5 & 6, 701-707, 2005

Madanmohan, Udupa, K., Bhavanani, A. B., Vijayalakshmi, P., and Surendiran, A., Effect of slow and fast pranayams on reaction time and cardio respiratory variables. European Journal of Applied Physiology, 99, 5, 457-466, 2007.

Mickleborough, T. D., Stager, J. M., Chatham, K., Lindley, M. R., and Ionescu, A. Pulmonary adaptations to swim and inspiratory muscle training. European Journal of Applied Physiology, 103, 6, 635-646, 2008

Naranjo, J., Centeno, R. A., Carranza, M. D., and Cayetano, M., A test for evaluation of exercise with apneic episodes in synchronized swimming. International Journal of Sports Medicine, 27, 12, 210-218, 2006

P. Raghuraj, A. G. Ramakrishnan, H. R. Nagendra, and S. Telles, Effect of two selected yogic breathing techniques on heart rate variability, Indian Journal of Physiology and Pharmacology, 42, 467-472, 1998

R. L. Bijlani, The Yogic Practices: Asanas, Pranayamas and Kriyas. In: Bijlani RL (ed). Understanding Medical Physiology, 3rd edition, New Delhi-India: Jaypee Brothers Medical Publishers (P), 883-889, 2004

Salguero, A., Gonzalez-Boto, R., Tuero, C., and Marquez, S. Relationship between perceived physical ability and sport participation motives in young competitive swimmers, Journal of Sports Medicine and Physical Fitness, 44, 3, 294-299, 2004

Sandeep, B., Pandey, U. S., and Verma, N. S., Improvement in oxidative status with yogic breathing in young healthy males, Indian Journal of Physiology and Pharmacology, 46, 349-354, 2002.

Stewart, A. M., and Hopkins, W. G., Consistency of swimming performance within and between competitions, Medicine Science and Sports Exercise, 32, 5, 997-1001, 2000

Taylor, S. R., Rogers, G. G., and Driver, H. S., Effects of training volume on sleep, psychological, and selected physiological profiles of elite female swimmers, Medicine Science and Sports Exercise, 29, 5, 688-693, 1997

Wells, G. D., Plyley, M., Thomas, S., Goodman, L., and Duffin, J., Effects of concurrent inspiratory and expiratory muscle training on respiratory and exercise performance in competitive swimmers, European Journal of Applied Physiology, 94, 5 & 6, 527-540, 2005.