



Effect of Pranayama on Attention Among Adolescents in Secondary Schools, West Bengal, India

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Abstract

A quasi experimental study was conducted to assess the effect of pranayama on attention among adolescents in selected secondary schools of West Bengal. The objectives were to assess and compare the attention level of the adolescents before and after Pranyam in pranayama (P) group and non-pranayama (NP) group, to evaluate the effect of Pranyam by comparing the attention level among adolescents in P and NP group and to find out the association of attention of the adolescents with selected demographical variables. Non-equivalent pre-test post-test control group design was adopted, where 144 students were involved through stratified random sampling technique as sample. Differences were compared in scores of Digit memory tests (DMT), Oral Trail making test part B and Stroop color tasks through independent t-test with $P < 0.05$ level of significance. The mean post-test attention score in DMT, and Stroop color test of the students of P group were significantly ($p = 0.05$) higher and lower in OTM-B task than NP group. It inferring that pranayama was effective in improving attention of the adolescents in P group, though some domain of attention depended on the students age and classes they reading in.

Keywords: Pranayama; Adolescents; Attention

Introduction

Adolescence, transitional phase of growth and development between child and adulthood, is the time of profound biological, intellectual, psychosocial and economic changes. In adolescent period school performances and academic achievements are very important, which may be harmful due to stress related to complicated tasks like role identification and carrier choice of this period [1]. Attention is the cognitive and behavioral process to concentrate on a particular thing or specific information from a complex, with attention ignoring perceivable information and narrowing the range of stimuli. The essences of attention are focalization and concentration of consciousness. Attention span is the amount of concentrated time a person can spend on a task without becoming distracted. Span of attention can measured by sustain attention. A student who cannot keep his attention fixed for a reasonable period is sure to lag behind in his studies. Inattention means a person wanders off task, lack of persistence, has difficulty sustaining focus, and is disorganized; and these problems are not due to defiance or lack of comprehension [2]. Stress and decision overload are the most important cause of inattention or reduced span of attention [7]. India has the world's highest number of 10 to 24 years old people (World Population prospects: 2015). Positive energy, good environment,

friends, teachers, outdoor games with regular yoga are the preventive measure in adolescent's health. During pranayama mind is passively attached with it. Mind is becoming calm, quite and tranquil as because of slow, smooth and prolonged breathing. Mental stress is also managed through pranayama [4]. So the introduction of pranayama in older adolescent helps to reach a higher position or aspects of achievements.

Objective of the Study

The major objectives of the studies were to assess and compare the attention level of the adolescents before and after pranyam in pranayama and non-pranayama group. This study also intends to evaluate the effect of pranyam by comparing the attention level among adolescents in pranayama and non-pranayama group with an intention to find out the association of attention of the adolescents with selected demographical variables.

Method and Materials Design and participants

This Non-equivalent pre-test post-test control group design and was approved by the Institutional Ethics Committee included 144 adolescent students in the age group 10 to 15 years (studying in grades VI- IX) through Stratified random sampling technique.

18 students from each stratum were selected by systematic random sampling technique for both pranayama and non-pranayama group. A written informed consent was obtained from all participants prior to their inclusion in the study. With the help of a questionnaire, participation eligibility was ascertained where all females were non-yoga practitioners and did not have formal training in yoga and pranayama.

Instrumentation

Digit memory test

The revised version (6th October 2004) of the Digit memory test was used in this study to test the controlled selective auditory attention of the adolescents in both groups. Standard score was used to measure the selective attention score. The adolescents were scored by adding total number managed backward and forward together. According to this tool gap between digit forwards and digit backwards, two is normal, whereas if the gap is larger than three, or smaller than one, this may be worthy of note [5].

Stroop color task

The Golden version (1978, for ages 5 to 90) of the Stroop color test (developed by John Ridley in 1935) [6] was used to assess the selective attention score of the adolescents in both groups. In this test, the number of items correctly named in 45s in each condition was calculated (i.e., word card, color card, color word card). Then the predicted CW score (Pcw) was calculated using the formula; $Pcw = (W \times C) / (W + C)$, then the Pcw value was subtracted from actual number of items correctly named in the incongruous condition (IG) based on the performance in both W and C conditions. A negative IG value represents a pathological ability to inhibit interference, where a lower score means greater difficulty in inhibiting interference [6].

Oral trail making test part B

The oral version of the Trail making test part B (OTMT part B - developed by Ricker and Axelrod; 1994, pp. 48–49) was used to assess the verbal attention of the adolescents in both groups. According to this tool the time in seconds adolescents has taken to complete the task. Therefore, higher score reveal greater impairment [7].

Procedure

A structured yoga session, developed by the researchers as they being a yoga instructor and with the help of expert guidance and reference. The 30-minute yoga sessions were structured as follows: 7-minutes initiation, 3-minutes of yoga postures, 12-minutes pranayama, a 3-minutes relaxation and 5 minutes time gap between changing poses and technique. Initiation involved Relaxation, OM chanting and Sourya Pranam. Yoga posture include Padmasana, Utkatasana and Bhujangasana. Pranayama focused on Nadi sudhi breathing, Bhastrica pranayama and Bhamari pranayama-Humming bee breathing. Relaxation involved OM chanting. The researcher had done one month Certificate Program under Vivekananda district wellness centre, Bankura District, West Bengal

state, India undertaken by AYUSH Ministry of Health and F.W. Govt. Of India. For the purpose of Yoga session, the Pranayama group of 72 subjects was divided into 4 batches consisting of 18 participants in each batch. Yogic poses (asanas) and pranayama practiced session was taught in group sessions, each session lasted for 30 minutes for two weeks. A common hall was used to teach and demonstrate the Yogic poses (asanas) and pranayama. Yoga session was done by the researchers. The pranayama groups were monitored for Yogic poses (asanas) and pranayama the practice in the school under the supervision of a researchers. The pranayama group received 9 times yoga session. Each eligible participant then entered the pre-test stage, which consisted of performing the Digit memory Test, Oral trial making test part B and Stroop colour test. Then Participants in the Pranayama group underwent a structured yoga session that consisted of one 30-min session. In contrast to the pranayama group, the participants in the control group were simply instructed to maintain their normal life without participating structured yoga session. After completion of 9 the structured yoga session program, all the participants were invited to enter for the post test. Each participant was asked to perform the Digit memory Test, Oral trial making test part B and Stroop colour test again for the comparison of pre-and post-test scores.

Data analysis and interpretation

Section 1

Finding related to demographic characteristics of the adolescents students In pranayama group most (52.8%) of the children belonged to the age group 10 to 12 years whereas in non-pranayama group most (56.9%) of the children were also belongs to the age group 13 to 15 years.

All the children of pranayama and non pranayama group were distributed equally (25% each) in the academic standards VI, VII, VIII and IX. Most (52.78%) of the children in pranayama group belonged to the joint family and in non pranayama group most (52.78%) of the children were also belongs to the joint family. In pranayama group 48.6% of the children were two siblings and in non pranayama group most (54.2%) of the children were also two siblings.

Section 2

Findings related to the pre test and post test attention scores of the adolescents before and after pranayama in pranayama group and in non pranayama group.

Section 3

Findings related to the effect of pranayama in terms of pre test and post test attention scores of the adolescents in pranayama group.

Section 4

Findings related to the effect of pranayama in terms of post test attention scores of the adolescents in pranayama and non pranayama group.

Variables	Pranayama group						Non-pranayama group					
	Mean		Median		Standard deviation		Mean		Median		Standard deviation	
	Pretest	Post test	Pretest	Post test	Pretest	Post test	Pretest	Post test	Pretest	Post test	Pretest	Post test
Digit memory test	82.06	91.72	81.00	90.50	12.34	11.96	84.39	85.36	81.50	83.00	12.72	13.73
Attention by Oral trail making test part B	36.20	18.00	28.90	21.80	24.70	19.50	30.73	26.95	21.05	17.29	27.50	25.65
Focused attention by Stroop color test	2.74	6.21	2.52	5.74	5.88	4.97	3.12	1.84	2.27	1.17	6.44	5.73

Table 1: Mean, median and standard deviation of pre test and post test focused attention scores by Digit memory test Attention by Oral trail making test part B, Stroop color test among adolescents in pranayama and non pranayama group.
P: Pranayama Group; NP: Non-Pranayama Group.

Attention score	Pre test			Post test			Mean difference	t' value
	Mean ± SD		Mean ± SD		Mean ± SD			
	Digit memory test	82.06 ± 12.34	91.72 ± 11.96	9.66	6.73*			
Oral trail making test part B	36.20 ± 24.70	18.00 ± 19.50	18.20	7.70*				
Stroop color test	2.74 ± 5.88	6.21 ± 4.97	3.47	7.28*				

Table 2: Mean, mean difference and standard deviation of pre test and post test attention scores of the adolescents in pranayama group and 't' value computed between those.

$t'_{0.05,71} = 1.99; p = 0.05.$

Attention score	Pranayama group		Non - pranayama group		Mean difference	t' value
	Mean ± SD		Mean ± SD			
	Digit memory test (DMT)	91.72 ± 11.96	85.36 ± 13.73	6.36		
Oral trail making test part B (OTM-B)	18 ± 19.5	26.95 ± 25.65	8.95	2.35*		
Stroop color test	6.21 ± 4.97	1.84 ± 5.73	4.37	4.88*		

Table 3: Mean, mean difference and standard deviation of post test attention scores of pranayama group and non pranayama group with independent 't' value computed between those.

$t'_{0.05,142} = 1.99; p = 0.05.$

P: Pranayama Group; NP: Non-Pranayama Group.

Section 5

Findings related to the association between attention scores and selected variables. Data revealed that Auditory attention scores of the students was dependent on their age and independent on their classes they reading in and number of siblings they have. It depicted that Verbal attention scores of the students was independent on their age and number of siblings they have whereas dependent on their classes they reading in. It also found that Focused attention scores of the students was not dependent on their age and their classes they reading in but dependent on number of siblings they have.

Discussion

In the present study the adolescents of lower age group (47 students of 10-12 years) and lower classes (46 students of class VI-VII) performed better (at and above median attention score 81) in DMT whereas who have less number of siblings (55 students has 1-2 siblings) scored below median. In the present study most (48 students) of the adolescents of lower classes (class VI-VII) perform better (at and above median score 23.05) in OTM- part B tasks and same (48 students) number of adolescents of the higher classes (class VIII- IX) scored below median. In the present study most (38 students) of the adolescents of higher classes (class VIII- IX) per-

form better (at and above median score 2.46) in Stroop color task and same (38 students) number of adolescents of the lower classes (class VI-VII) scored below median. In the present study selective auditory attention scores of the adolescents was depend on their age as young children do not have mature selective auditory attention skills. The present study result showed that performance in oral trail making test part B and Stroop color test was strongly associated with their academic classes they read in. This pattern is consistent with previous study showing that education always correlate to perceptual and motor performance [8].

The present study is supported by the single cross sectional study conducted by Nilsoge. D, Bagade A., *et al.* (2016) In the study reference the researcher use Narisudhi, Bhastrica pranayama and Ujjayi breathing technique to evaluate of attention and verbal memory in yoga practicing pre-adolescents. They found the specific technique were effective to increase the attention and verbal memory in experimental group than control group [9].

Conclusion

It can be concluded that adolescents school students who practice pranayama in the 9 sessions showed better performance in auditory, verbal attention span and focused attention tasks compared with the adolescents in control group. Practice of pranayama alters the structures of brain [8] and improve memory which contribute directly to the development of cognitive performance skills and executive skill of the students, possibly leading to improvement in attention and memory if practice regularly. Larger randomized controlled trials are needed to validate these findings.

Recommendation

On the basis of the findings of the study following recommendations were made for further research:

- A similar study could be replicated on a large sample in a multi-center trial with different demographic characteristics.
- A similar study could be done to find out the bio-physiological effect of pranayama.

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