



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 9, Issue, 6(E), pp. 27536-27540, June, 2018

**International Journal of
Recent Scientific
Research**

DOI: 10.24327/IJRSR

Research Article

ROLE OF SURYA NAMASKARA AND PRANAYAMA ON INTELLIGENCE QUOTIENT IN SCHOOL CHILDREN

Guru Deo and Pankaj Kamal

Department of Bioenergy, Division of Yoga & Physical Science, S-VYASA, Bangalore, India

DOI: <http://dx.doi.org/10.24327/ijrsr.2018.0906.2280>

ARTICLE INFO

Article History:

Received 4th March, 2018
Received in revised form 25th
April, 2018
Accepted 23rd May, 2018
Published online 28th June, 2018

Key Words:

Surya namaskara, pranayama, intelligence quotient, memory, attention

ABSTRACT

Background: Yoga is an ancient science of traditional practices which has beneficial effects on attention, concentration and memory. Sun Salutation is one of the yogic techniques which consist of postures and breathing practice. Studies have reported that it is one of the effective techniques to overcome various psychosomatic disorders and ailments. Pranayama is a breathing tool to regulate the flow of vital energy in the whole body. It gives positive effect on the body and mind conducive for yogic awareness.

Aim: To assess the combined effect of suryanamaskara and pranayama on intelligence quotient in school children.

Methods and materials: Sixty school children were taken into the study based on convenient sampling. Single pre post design was used to carry out this study with 30 days of intervention. Assessment was done before commencement of practice and after 30 days. Digit symbol substitution task, digit span test (forward & backward) and stroop test were performed to assess the changes at psychological level due to pranayama and sun salutation practice.

Result: Results showed that there was increase in value of digit symbol substitution task and digit span test ($p > 0.001$) which were highly significant. This also reflects the better performance of cognitive faculty in school children due to Surya Namaskara and Pranayama practices.

Result of stroop exhibited that significant improvement ($p > 0.001$) in concentration and attention. The forwards digit span showed highly significant increased values which means after practice of Yogic practices subjects started more scoring in post assessment.

Conclusion: The study showed that suryanamaskara and pranayama gives synchronizing and harmonizing effect on cognitive aspect of mind. The attention, memory and concentration improved significantly after thirty days of suryanamaskara and pranayama practice. Incorporations of surya namaskara and pranayama in school curriculum can lead to the improvement in the performance of attention, concentration and memory oriented tasks in students.

Copyright © Guru Deo and Pankaj Kamal, 2018, this is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Yoga is an ancient science of traditional practice which is labeled as yogic science. It has various aspect of contributing a holistic health through its principle and practices. It includes practices of yogic postures, Pranayama (regulated breathing practices) and meditation. Various scientific researchers have proved that yogic techniques produce consistent and beneficial physiological changes. Now it is considered as way of life(1). Regular practice of Yoga leads to development of sound body, beautiful mind, joyful soul and a healthier approach towards life. Yoga has ability to maintain cognitive controls, specifically in attention, memory, concentration and arousal control(2). It maintains functional harmony between body and mind (3). Integrated approach of yoga therapy (practices

include breathing practice, sun salutation, cyclic meditation) can improve cognitive functions such as remote memory, mental balance, attention and concentration, delayed and immediate recall, verbal retention and recognition tests (4). Yoga practices performs significant effect in cognitive function (5). Yoga helps to improve mood, activity and self-regulation skills pertaining to emotions and stress in school students (6).

Pranayama is not merely breathing exercise or breath retention but more than this. It is technique through which the quality and quantity of Prana is stimulated and activated in body to a higher frequency. It helps to circulate the Prana all over the body smoothly and in a proper manner so that it increases the brain function. Because it is said in Hatha yoga that "control the Prana and the mind is automatically controlled (7).

*Corresponding author: **Guru Deo**

Department of Bioenergy, Division of Yoga & Physical Science, S-VYASA, Bangalore, India

Regulated breathing rate enhances dynamism, vitality and general well being. It maintains the tranquility of mind. Pranayama practices calm down the mind and control the thought process. It slows down the respiratory rate and establish a more relaxed rhythm which leads to a attentive and tranquil mind (8).

Surya Namaskara is an ancient tradition which has been in existence from Vedic time. It is series of yogic postures which contains 12 counts. Different yoga masters mentioned different way of practice with numbers of counts based on their experience and objective. It is a limb of yoga. It incorporates physical activity, breathing synchronization, awareness and relaxation. When it is practiced daily, systematically, correctly and faithfully with an attitude of offering gratitude and salutation heartily to lord sun, it has various benefits. It eradicates lustful actions and the special weakness of man and woman etc. It strengthens the nervous system and heart. It puts impact on individual's perception and performance(9).

Intelligence is defined as general cognitive problem-solving skill. Intelligence is what you do when you don't know what to do. Intelligence is a continuous trait. Intelligence is very crucial and weighty component of the function of brain in school children. It plays significant role to develop their confidence, personality, radiant thinking and education(10).

There are various studies on the effect of yoga and other relaxation technique on cognitive ability in normal and abnormal children. There is no study on combined effect of Pranayama and sun salutation on intelligence quotient (IQ) in school children. This study is to assess the combined effect of Pranayama and sun salutation on IQ in rural school children.

There is no any study on this topic. It is needed for the society in the such context that practicing combined Surya Namaskara and Pranayama can increase the intelligence, concentration and cognitive function of the school children.

Scope of this study is broader where students learn a lot in multiple ways. This study is about school children's intelligence which is the foundation of life in academic and developmental aspects stages of life. If a child's intelligence is increased in school days, it will be the greatest foundation for their future.

Aim and Objective

The aim of this study is to assess the combined effect of Surya Namaskara and Pranayama on intelligence quotient in school children. The associated goal directed to observe the effect of Surya Namaskara and Pranayama on memory and performance of concentration and sustained attention.

METHODS AND MATERIALS

Sixty school children were taken into the study from Utkramit Madhya Vidyalaya (middle school) Walipur, Patna, Bihar. They were studying in 6th to 8th standard in the same school. The selection was based on convenient sampling consists of 30 male and 30 female. There were two males and one female dropped out from the study because of their own personal problem. All participants and their guardians were informed about the study in details, need for research on the topic and benefits of participation. All participants' guardian gave their

consent to allow them to take part in the study. This study was approved by institutional ethical committee of SVYASA.

The inclusion criteria were healthy school children who were studying in middle school, age range between 11 and 16 years, both genders, who knows Hindi & Basic English language and willing to participate in the study. Participants who have been suffering from any chronic illness or psychological disorder and had practiced Yoga within last one year were excluded from the study.

In this study, there was only one group. Single pre- post design was used in this study. Assessment was taken before the starting intervention. After the 30 days of intervention again assessment was done by the same group of people involved in conducting the research.

Intervention

Combination of Surya Namaskara and Pranayama was given for 45 minutes regularly except Sunday for 30 days. Subjects started the practice with chanting of three times omkara followed by Surya Namaskara. They were given instruction to practice 15 minutes of Surya Namaskara practice (7-8 rounds). Subsequently, they were asked to lie down on supine posture. Deep relaxation technique (DRT) was also administered to give relaxation for the body and mind as well for 10 minutes. After it, they came to sitting position and adopted a comfortable posture (sukhasana). In this posture they practiced Kapalbhath for 5 minutes at their own pace. They used to take rest in between when felt tired. After that Nadi shuddhi pranayama was given followed by Bhastrika and Bhramari for five minutes each. They were asked to remain seated to get stillness of body and mind in the same posture by closing their eyes. The session was closed with one omkara and three shanti.

Assessment Tools

Digit-Symbol Substitution Task (DSST)

DSST is a neuropsychological test which required participants to copy symbols within particular time limit. It is measuring tool, used for diverse cognitive functions like visual scanning ability, visual perception, learning ability, short term memory, encoding and retrieval process, concentration and attention (11).

Digit Span Test (Forward & backward)

This test presents the examinee with span of digits to help for evaluating potential deficits in attention and working memory. The measure has both a 7-items digits forward task and a 7-items digit backward task, each with its own individual score. Because the two paradigms measure distinct function, the disparate scores allow for richer interpretation than that provided by similar assessment instruments (11).

Stroop Color and Word Test

This test involves both word and color naming responses. The test is based in a booklet containing three pages of word and color conditions. The first test about how fast subject can name the colors, name the color of the ink words were printed in, ignoring the word that was printed for each items in second

page, read the words in the third page. Time taken by subjects to complete the test was recorded by stop watch (12).

RESULTS

In the current study, the result showed that DSST values increased highly significantly in post assessment in comparison to pre assessment which indicates the improvement in memory and concentration ($p < 0.001$). This also reflects the better performance of cognitive faculty in school children due to Surya Namaskaraand Pranayama practices.

DST was used to track working memory. It consists of forwards and backward digit span which indicates the current functioning of memory. Here in current study result exhibited very convincing. The forwards digit span showed highly significant increased values which means after practice of Yogic practices subjects started more scoring in post assessment. Even in the backwards, functioning of memory was observed enhanced. The functional memory improvement was seen in all the assessment – forward and backward ($p < 0.001$).

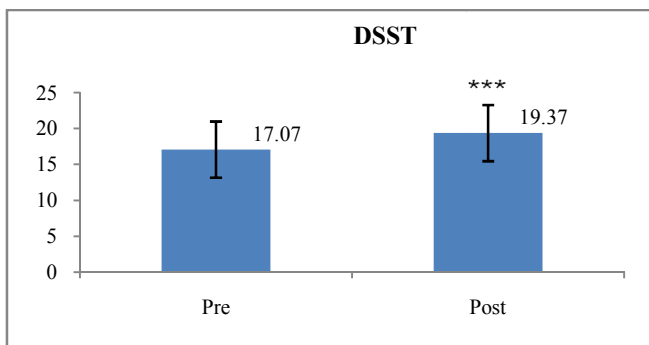
Stroop test was performed to assess the attention and concentration. Stroop was intervened in 3 ways which all together showed highly significant positive improvement ($p < 0.001$). In the first part of stroop, children were asked to read the letter as indicated through color. The post value was decreased significantly indicating improvement in attention and concentration while performing the given task. In the second phase of stroop, children were asked to read the indicated color ignoring the written name of word. The value in post assessment was decreased significantly ($p < 0.001$) in observation. The third phase was to read word as it was written on the sheet.

Table 1 showing pre and post mean values of DSST and DST

Variables	Pre (mean±SD)	Post (mean±SD)	% increase	P-value
DSST	17.07±3.972	19.37±3.862	13.47	.001
DST (forward)	7.77±1.524	8.74±1.717	12.48	0.001
DST (backward)	2.70±1.085	3.67±1.327	35.92	0.001

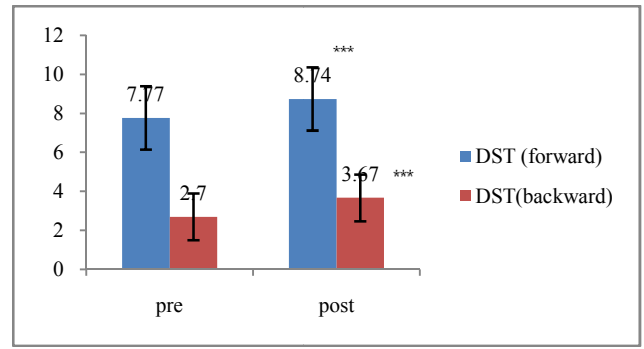
Table 2 showing pre and post mean values of stroop

Variable	Pre (mean±SD)	Post (mean±SD)	% increase	P-value
Stroop (word score)	67.53±8.840	62.75±8.769	7.61	0.001
Stroop(color score)	145.65±9.922	140.42±8.600	3.72	0.001
Stroop(color-word score)	66.26±11.620	61.86±10.229	7.11	0.001



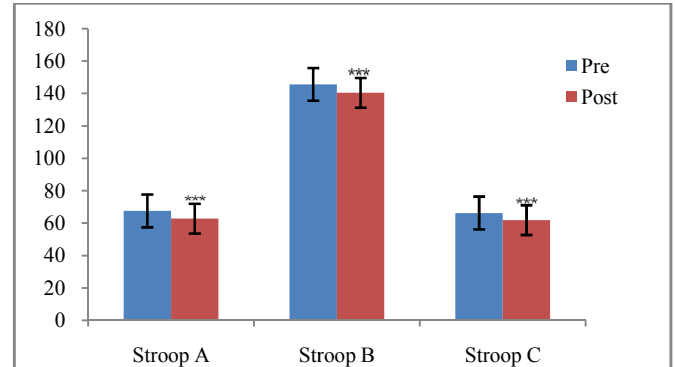
Graph 1 showing mean values of Digit Symbol Substitution Task

***= $p < 0.001$, DSST= digit symbol substitution test



Graph 2 showing pre-post mean value of Digit Span Test

$p < 0.001$ ***, DST= Digit Span Test



Graph 2 showing pre-post mean value of Stroop Test

***= $p < 0.001$, A= Word, B= Colour, C= Colour- Word

DISCUSSION

The present study evaluated the changes after Surya Namaskaraand Pranayamapractices on intelligence quotient in the components of attention, concentration and memory (Digit span test, DSST and Stroop). Result had shown that there was increase in recall of digit span test and digit symbol substitution task ($P < 0.001$). The value increased in the digit span test indicates that after practice of 30 days yogic practice attention was much more effective in particular given task. In the forward span test all children got more score and even in the backward score also increased. This trend showed that all children were garsping auditory working memory and attention increased significantly. Another study done measuring cognitive function through slow and fast Pranayamain healthy volunteers. Subjects were randomized into three groups fast Pranayama, slow Pranayama, and control group. Assessment were taken pre and post of intervention. There was significant improvement in digit span forward ($p < 0.001$) in both groups while a change in digit span backward was seen only in fast Pranayamagroup which showed an significant improvement in auditory working memory and sensory motor performance only in fast Pranayama group. This study also reports that both slow and fast Pranayama are beneficial for cognitive functions (13).

Another study done on measuring immediate effect of nostril breathing on memory performance. Subjects were selected from a yoga school. They were randomly allocated to perform three different types of nostril breathing, i.e, right nostril breathing, left nostril breathing, alternate nostril breathing and breath awareness. Assessment were taken before and after 30 minutes of practice by digit span test. Right nostril breathing

showed that there was significant increase in digit span forward and digit span backward ($p < 0.001$). alternate nostril breathing also showed there was significant increase in digit span backward test ($p < 0.014$). This study states that right nostril breathing and alternate nostril breathing improves the memory performance (14).

There was another study which reported that verbal and spatial memory through intervention of left, right and alternate nostril breathing gives effect on the nervous system. 51 participants were selected and allocated into three different groups, i.e, left nostril breathing, right nostril breathing and alternate nostril breathing. Assessment were taken before and after 45 minutes of intervention for three consecutive days by digit span test. There was significant increase in digit span forward and backward with all the three breathing practices. The ANOVA showed there was significant improvement in memory scores for all the three groups ($P < 0.005$). After comparing all the three groups it is found that left nostril breathing has better memory score than right nostril breathing and alternate nostril breathing (15).

The post assessment of DSST also exhibited the trend of increasing values. The increasing values of DSST showed that that all the children got benefitted due to yogic practice. They were more concentrated in their task assessed by the post assessment. Another study done on cognitive function through two relaxation based yoga techniques cyclic meditation and supine rest. Both relaxation techniques have shown improved scores on DSST ($P < 0.001$). yogic relaxation technique may improve the processing speed and working memory. Cyclic meditation is more effective in enhancing processing speed, short term memory and verbal working memory (16). Memory and attention through intervention of early rising (brahma muhurta), i.e, before 4:30 am based on traditional indian astrological calculations and sleep at 9 pm. Control group was practicing late rising 7 am and sleep at 11 am. Assessment (DSST) was taken at baseline, day 10 and day 20. The RM ANOVA showed significant difference within assessment ($p < 0.001$). early rising (brahma muhurta) group showed there was significant improvement in net score of DSST ($p < 0.05$) after 20 days of intervention. Early rising in the morning for 20 days improves the performance in attention, concentration and memory (17).

Through intervention of kundalini yoga on memory was carried out to the effect. There were four groups in study. Group 1 practiced kayakalpa (kundalini yoga), Group 2 practiced kayakalpa, exercise and meditation, Group 3 practiced exercise and meditation and Group 4 was a control group. Assessment (DSST) was taken at baseline (pre), during (mid) and after the intervention (post). Group 1 showed significant improvement on memory ($p < 0.001$) while other groups did not show any improvement ($p < 0.560$). The RM ANOVA showed that there is significant difference in post assessment compared to pre ($P < 0.001$) and mid assessment ($p < 0.004$) of DSST (18).

Measurement of cognitive function was carried out in older meditator adults. There were two groups i meditation and control group. Participants selected for meditation group were a long term practitioner of meditation at least past 10 years and

spent more than 1 hour daily for meditation practice. Control group was formed with 20 males who were matched with same age, education and socioeconomic status to meditation group. Result showed that there was significant improvement in substituted digits by meditation groups compare to the control group ($P < 0.001$) in DSST. This study states that long term concentrative meditation improves the attention and processing speed (19).

There was decrease in recall of Stroop test which refers to concentration power increased ($P < 0.001$). The stroop test showed that all the children were improved their speed of reading the given test more effectively without committing mistake. The time taken by them to complete the test was reduced significantly. They were performing the task after 30 days more efficiently than pre assessment. This indicates that after 30 days of practice of Pranayama and Surya Namaskara they improved their attention, concentration and memory to grasp, process and regulate their functioning of brain. Study showed significant improvement in Stroop color-word test after trataka session (yogic practice) compared to the control session. Performance on the Stroop color-word test was better after trataka practice which means trataka increase the selective attention, cognitive flexibility and response inhibition (20).

Study done on physical, cognitive and emotional measures through yoga or physical exercises. 98 school children were randomized in physical and yoga group. Yoga group practiced yogic postures, chanting, loosening exercises and Pranayama where as physical group practiced forward and backward bending, side bending, jogging in place and games. Assessment were taken before and after the intervention by Stroop. Both groups showed significant improvement in Stroop test ($p < 0.001$) which stated that attentional vitality and flexibility are significantly increased (21).

The current study exhibited the results in line of above mentioned studies where improvement was seen significant in all the children. This study has shown that in particular age if children will be exposed to some of the yogic practices the pattern of attention and memory will function efficiently. This will be more beneficial to the future of children where memory is needed to learn different dimension of knowledge.

Strength of the study

Perhaps this is the first study conducting combined effect of Surya Namaskara and Pranayama on intelligence quotient in school children. Three assessment tools were used to measure attention, concentration and memory scores in specific age group of school children. Unlike other studies where either effect of Surya Namaskara or Pranayama were used to measure attention, concentration or memory, combined intervention were given in this study. This study has shown that combined intervention are more effective to enhance the cognitive aspects of functioning of brain.

Limitation

This study is limited to only one school with some specific intervention. The assessment were used only psychological measurement i.e. questionnaires. There is no control group in the study which is another limitation. Study has only specific

age group children so cannot be generalized to another group. School is based in particular area where specific language speaker children were included in the study.

Recommendation for Future Study

The future study should include the following suggestions : a) control group to compare the result ;b) multicentre sampling to generalize the findings; c) include some objective variable such as brain wave mapping; d) equal number of both groups with more sample size.

CONCLUSION

Previously either surya namaskara or pranayama effect has been assessed on attention, concentraion and memory separately. The current study explored the effect of both the practices together on cognitive functions. Its effecacious effect has been found in this study. Incorporations of surya namaskra and pranayama in school curriculum can lead to the improvement in the performance of attention, concentration and memory tasks in students. Although this preliminary research is promising, well- designed yet further study needs a strong recommendation to explore different aspects of mind and its functions especially in school children with established objective parameters.

Acknowledgement

All the support and help given by the school administration to conduct this study is highly acknowledged.

References

1. Mittal U, Akhtar S. Impact of yoga on emotional intelligence, spiritual intelligence and psychological well-being in male and female yoga practitioners. In: New facets of positivism. 2011. p. 177–91.
2. Nangia D, Mahlotra R. Yoga, Cognition and Mental Health. *J Indian Acad Appl Psychol.* 2012;38(2):8.
3. Ankad R, Patil S, Chinagudi S, Herur A, Shashikala G. Effect of short-term pranayama and meditation on cardiovascular functions in healthy individuals. *Heart Views.* 2011. p. 58.
4. Chattha R, Nagarathna R, Padmalatha V, Nagendra HR. Effect of yoga on cognitive functions in climacteric syndrome: A randomised control study. *BJOG An Int J Obstet Gynaecol.* 2008;115(8):991–1000.
5. Kumari S, Reddy G. Effect of short term yoga practices on cognitive function and attitude towards violence in school children - A randomized control study. *Voice Res* [Internet]. 2015;3(4):14–6. Available from: http://www.voiceofresearch.org/Doc/Mar-2015/Mar-2015_5.pdf
6. Hagen I, Nayar US. Yoga for children and young people's mental health and well-being: Research review and reflections on the mental health potentials of yoga. *Front Psychiatry.* 2014;5(APR).
7. Muktibodhananda S. Hatha Yoga Pradipika. 4th ed. Munger: Yoga Publication Trust, Ganga Darshan, Munger; 1985. 35 p.
8. Saraswati SS. Asana Pranayama Mudra Bandha. Fourth. Munger: Yoga Publication Trust, Ganga Darshan, Munger; 2002. 544 p.
9. Javadekar P, Manjunath NK. Effect of Surya Namaskar on Sustained Attention in School Children. *J Yoga Phys Ther.* 2012;02(02):2–5.
10. Deary IJ. Intelligence. *Annu Rev Psychol.* 2012;63:453–82.
11. Wechsler D. Wechsler Intelligence Scale For Children. Fourth Edi. U.S; 2003. 17 p.
12. Stroop JR. Studies of interference in serial verbal reactions. *J Exp Psychol.* 1935;18:643–62.
13. Sharma VK, M. R, S. V, Subramaniyan SK, Madanmohan, Sahai A, et al. Effect of Fast and Slow Pranayama Practice on Cognitive Functions in Healthy Volunteers. *J Clin Diagnostic Res.* 2014;8(1):10–3.
14. Thakur GS, Kulkarni DD, Pant G. Immediate effect of nostril breathing on memory performance. *Indian J phisiology pharmacology.* 2011;55(1):89–93.
15. Garg R, Malhotra V, Tripathi Y, Agarawal R. Effect of Left, Right and Alternate Nostril Breathing on Verbal and Spatial Memory. *J Clin Diagnostic Res.* 2016;10(2).
16. Bhargav P, Bhargav H, Raghuram N, Garner C. Immediate effect of two yoga-based relaxation techniques on cognitive functions in patients suffering from relapsing remitting multiple sclerosis: A comparative study. *Int Rev Psychiatry.* 2016;28(3).
17. Shankar K v, Bhat RR, Nandi Krishnamurthy M. influence of early rising on performance in task requiring attention and memory. *Indian J phisiology pharmacology.* 2012;56(4):337–44.
18. Arumugam S, Ramchandran K. Effect of kundalini yoga on psychological health in young students. *Indian J Posit Psychol.* 2013;4(1):7–13.
19. Prakash R, Rastogi P, Dubey I, Abhishek P, Chaudhury S, Small BJ. Long-term concentrative meditation and cognitive performance among older adults. *Ageing Neuropsychol Cogn.* 2012;19(4):479–94.
20. Raghvendra B., Singh P. Immediate effect of yogic visual concentration on cognitive performance. *J Tradit Complement Med.* 2016;6(1):34–6.
21. Telles S, Singh N, Kumar A, Kumar A, Balkrishna A. Effect of yoga or physical exercise on physical, cognitive and emotional measures in children: a randomized controlled trial. *Child Adolesc Psychiatry Ment Heal.* 2013;7(1):1–28.

How to cite this article:

Guru Deo and Pankaj Kamal. 2018, Role of Surya Namaskara and Pranayama on Intelligence Quotient In School Children. *Int J Recent Sci Res.* 9(6), pp. 27536-27540. DOI: <http://dx.doi.org/10.24327/ijrsr.2018.0906.2280>
