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ORIGINAL ARTICLE

A Comparative Study of Basic and Advanced Asanas on Cognitive Learning in School Children

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ABSTRACT

Background: This study examines the comparative effects of basic and advanced yoga asanas on cognitive learning among school children, aiming to determine which type of asana practice more effectively enhances cognitive functions. With growing interest in integrating physical activities, especially yoga asanas, into educational settings, this research assesses how different levels of asana practice influence key cognitive skills, including attention, memory, executive function, and academic performance.

Methodology: The study was conducted with 90 school children, randomly divided into three groups: one group practiced basic asana (BG=30), another engaged in advanced asana (AG=30) and a control group (CG=30), that did not receive any specific training over a period of four weeks. Non-verbal abstract reasoning and problem-solving abilities were assessed using the Raven's Progressive Matrices (RPM). The Wechsler Intelligence Scale for Children (WISC) was used to assess cognitive abilities and the Digit Span Test (DST) was used to assess memory recall. All were administered before and after the intervention.

Result: The 3-group (BG, AG, CG) x 2-time (pre, post) mixed-method ANOVA result showed that there was a significant main group and time interaction ($p<.001$) in all three tests. The following post hoc result revealed that for RMP, WISC and DST the AG significantly improved post compared to pre ($p<.001$). The AG also demonstrated substantial improvement in all the parameters compared to the CG at post-reading ($p\leq.001$). Further, AG demonstrated significant improvement compared with BG at post in the RMP and WISE ($P\leq.001$). The BG group showed a significant improvement in WISE and DST at post comparison ($p<.001$). In contrast to CG, BG also demonstrated considerable improvement in the WISE and DST at post comparison ($p<.001$).

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Conclusion: The findings indicate that advanced asanas, with their more complex postures and greater physical challenge, have a more positive effect on cognitive learning, particularly on attention and problem-solving abilities in school children.

KEYWORDS

• Basic Asana • Advanced Asana • Cognitive Learning

INTRODUCTION

In modern yoga practice, asanas serve to maintaining a better health. Good health is achieved in practice of asanas by improving aerobic capacity, muscular strength, endurance, and balance.[1,2] The practice continues to evolve while maintaining its original purpose of creating harmony between physical and mental states.[3] Scientific study demonstrates that regular asana practice improves flexibility reduces musculoskeletal pain and enhances proprioception.[4] It has also found that regular asana practice is positively linked to improving cardiovascular health, cognitive function and academic performance in children.[5-7] Remarkably, the therapeutic applications of asanas now extend to rehabilitation programs and workplace wellness initiatives.[8] The promising beneficial effect of asana is making research interested in normal and special needs children in light of cognition and motor skills.[9,10]

Asanas are typically categorized into basic (beginner) and advanced (complex) postures, each serving distinct purposes. Basic Asanas (e.g., Tadasana – Mountain Pose, Balasana – Child's Pose) focus on alignment, relaxation, and foundational body awareness. These poses are particularly beneficial for younger children, as they promote calmness, improve posture, and enhance concentration without requiring extreme physical exertion.[6] The three key characteristics of basic asanas are Accessibility: Require minimal flexibility or strength. Safety: Low risk of injury when performed correctly. Adaptability: Easily modified for different body types and abilities.

Advanced Asanas (e.g., Sirsasana – Headstand, Bakasana – Crow Pose) demand greater coordination, strength, and mental discipline. Research suggests that such postures stimulate neuroplasticity, improve executive functioning, and enhance problem-solving skills in older students by challenging both body and mind.[11] Key characteristics of advance asanas are Technical Complexity: Involve intricate biomechanics and multiple points of balance. Physical Demands: Require significant muscular strength, joint mobility, and proprioceptive awareness. Energetic Intensity: Generate substantial heat (tapas) and pranic activation. Common categories of advanced asanas are Arm Balances: Eight-Angle Pose (Astavakrasana) - requires core strength and shoulder stability. Deep Backbends: King Pigeon Pose (Kapotasana) - demands spinal flexibility and hip opening. Advanced Inversions: Scorpion Pose (Vrschikasana) - combines backbending with inverted balance.[12-13]

The mechanism of asanas directly or indirectly influences the higher brain center, those areas responsible for memory and cognition.[13-14.] The practice of asana has been shown to stimulate the parasympathetic nervous system, reducing stress hormones like cortisol while increasing beneficial neurotransmitters such as GABA.[15] Neuroimaging studies reveal that regular practice can enhance prefrontal cortex activity - the brain region responsible for executive functions including attention, working memory, and decision-making.[16] In school environments, where cognitive demands are high, incorporating structured asana practice has been shown to improve attention spans, reduce hyperactivity, and boost academic performance.[4]

The present study was built on this premise of the mechanism of different kind of asana and their effect on cognition. So, the aim of the present study was to compare the effects of basic and advanced asanas on cognitive learning in school children.

METHODOLOGY

Design

It was a three group comparisons study. The study was conducted on 90 school going children as a subject of the study. They were

randomly assigned in to three group: 30 children in the basic asana group (BG), 30 children in the advanced asana group (AG) and 30 children in the control group (CG). The subjects were studying in the Memorial Model Academy, Yairipok, Manipur. The inclusion criteria were healthy subject with age range between 11 to 14 years and students willing to participate in the study. The students already engaged in any type of yoga practice, age beyond range, cognitive impairments, or physical limitations were exclusion criteria of the study. The study's protocol was presented in institutional human ethics committee at Manipur University and obtained human ethical clearance (ref no. MU/IHEC/2025/20, dated 20th August 2025).

Intervention: BG practiced a set of basic movement of asana where AG practiced similar asana in more advance movement or its advanced position. Both groups practiced their asana session 6 days in a week for 4 weeks under guided supervision.

Measurement variables:

Table 1: The following Asanas practice which was given to the children

Sequence of Asanas	Basic asanas	Advance Asanas
Standing	1. Trikonasana	1. Parivrtta Trikonasana
	2. Parsvakonasana	2. Parivrtta Parsvakonasana
	3. Padahastasana 1	3. Padahastasana 2
	4. Virabhadrasana 1	4. Virabhadhrasana 3
	5. Vrikshasana / Tadasana	5. Garudasa
Supine	1. Setubandhasana	1. Eka Pada Setubandhasana
	2. Uttanpadasana	2. Sarvangasana
	3. Ardha Halasana	3. Halasana
Prone	1. Bhujangasana	1. Purna Bhujangasana
	2. Dhanurasana	2. Purna Dhanurasana
	3. Eka Pada Shalabhasana	3. Shalabhasana
Sitting	1. Dandasana	1. Paschimottasana
	2. Vakrasana	2. Purna Matsyandrasana
	3. Baddhakonasana	3. Kurmasana
	4. Akarna Dhanurasana	4. Parivrtta Akarna Dhanurasana
	5. Janusirsana	5. Parivrtta Janusirsana
	6. Sukhasana	6. Padmasana
	7. Vajrasana	7. Supta vajrasana
	8. Ardha Ustrasana	8. Ustrasana
	9. Sasankasana	9. Yoga Mudrasana

Measurement tool: To measure the different aspect of cognition, in the present study the following tools were administrated. Measurement was taken on three group before commence of study as pre data and after 4 weeks post data.

1. The Raven's Progressive Matrices (RPM)

The Standard progressive Matrics (SPM) is a popular nonverbal intelligence test. The tools measures abstract reasoning and fluid intelligence through pattern recognition in visual matrices. The tool is widely applied in clinical neuropsychology, education, and research. In the tool, there are series of similar geometrics figure and participant has to find out the missing figure. It starts with simple and progress in difficulty. Suitable for individuals aged 6 to 16 years, the test typically takes about 45 minutes to complete and consists of 60 items divided into five sets (A to E), with each set increasing in difficulty. Each item presents a visual pattern with a missing piece, and the test-taker must choose the correct option to complete the pattern. Scoring is straightforward—each correct answer earns one mark, and the total score is based on the number of correct responses out of 60. An answer key is provided with the test, enabling examiners to quickly and accurately score responses and interpret results using normative data to estimate general cognitive ability.[17]

The Wechsler Intelligence Scale

The Wechsler Intelligence Scale for Children (WISC) is a widely used standardized tool for assessing speed and visual-motor coordination. The tool is reliable to the children aged 8 to 16 Years. In this test, there are mark simple lines or shapes under numbers per a key. Participant has to copies symbols beneath corresponding digits in rows as quickly as possible without errors. It needs complete within a 120-second time limit.[18]

Digit Span Test

Digit Span Test (Forward and Backward): It measures the short-term memory and working memory capacity of an individual. In this test, participant needs to recall digit as forward and backward way.[19]

DATA ANALYSIS AND RESULTS

Data was analyzed using the 3-group (BG, AG, CG) x 2-time (pre, post) mixed-method ANOVA. Based on significant group and time interaction post hoc comparison was done

with Bonferroni correction. The significance level was set p-value was set as p=0.05.

RPM: The factorial ANOVA results showed that there was a significant main group and time interaction F(2, 87)= 11.8, p<.001, η^2p= 0.204. Followed by post hoc result demonstrated as follows:

Table 2: Raven's Progressive Matrices (RPM)

Group	Pre Mean ±SD	Post Mean± SD
BG	40.3 ± 3.92	42.1± 4.16
AG	42.3 ± 3.52	46.5 ± 4.94
CG	43.0 ± 3.42	42.8 ± 2.64

Note: BG: Basic Asana Group, **AG:** Advanced Asana group, **CG:** Control Group.

In the RMP, the BG demonstrated a moderate increase, which was statistically nonsignificant (t=2.76, p= 0.105). The AG showed a notable improvement, which was statistically significant (t= 6.27, p<.001) compared to pre - post reading. In contrast to CG, there was a slight decline in the RMP score from post-reading compared to pre-reading, which was statistically nonsignificant (t=0.4, p=1.00). In the between-group comparison, only the AG group substantially showed a significant improvement in post-reading in comparison with BG (t= 4.16, p=.001) and CG (t= 3.59, p=.009).

WISC: The factorial ANOVA results showed that there was a significant main group and time interaction F(2, 87)= 40.7, p<.001, η^2p= 0.483. Followed by the post hoc result demonstrates as follows:

Table 2: Wechsler Intelligence Scale for Children

Group	Pre Mean ± SD	Post Mean± SD
BG	60.1 ± 3.04	68.3 ± 4.83
AG	59.5 ± 3.17	75.1 ± 6.66
CG	61.3 ± 3.04	62.3 ± 4.68

Note: BG: Basic Asana Group, **AG:** Advanced Asana group, **CG:** Control Group.

The BG showed a significant improvement in WISC (t=7.24, P<.001) in comparison to pre-post comparison. The AG also demonstrated greater improvement with marked significance (t=13.69, p<.001) in comparison to the pre-post reading. The CG exhibited a minimal improvement, which was not significant (t=.93, P=0.93). In contrast to the between-group comparison, the BG showed a significant improvement in the post-reading in comparison to CG (t=4.23, p<.001). The AG showed a significant improvement in the post-reading in comparison to BG (t=4.82, p<.001) and CG (t=9.05, p<.001).

The DST: The factorial ANOVA results showed that there was a significant main group and time interaction F (2, 87) = 40.7, p<.001, η^2p= 0.483. The post hoc results demonstrate as follows:

Table 3: Digit Span Test (DST)

Group	Pre Mean ± SD	Post Mean ± SD
BG	19.8 ±1.50	22.9 ±1.80
AG	19.8 ± 1.37	23.5 ± 1.78
CG	19.6 ± 1.07	19.6 ± 1.16

Note: BG: Basic Asana Group, AG: Advanced Asana group & CG: Control Group.

The BG demonstrated a notable 3.1-point mean increase in DST. The increase in mean showed a significant change, t=8.36, P<.001, in the pre to post comparison. In the case of AG, it exhibited the greatest improvement, with a 3.7 -point increase in mean scores from pre-to post test that was highly significant (t=8.36, P<.001). The CG showed no change in DST scores. In contrast to the between-group comparison, the BG showed a significant improvement in post-reading compared to CG (t=7.95, p<.001) and the AG showed a significant improvement in post-reading compared to CG (t=9.05, p<.001).

DISCUSSION

The study was to examine and compare the effects of basic and advanced yoga asanas on cognitive learning abilities in school children. Cognitive learning encompasses processes such as attention, memory, comprehension, and problem-solving, which are essential for academic performance and overall mental development in students. The results revealed a statistically significant improvement in cognitive learning outcomes in both groups—those practiced basic asanas and those engaged in advanced asanas. However, the group practiced advanced asanas demonstrated greater cognitive gain across the variables.

General Impact of Asanas on Cognitive Learning:

Consistent with previous research, both basic and advanced asanas positively influenced cognitive learning. The intervention improved concentration, memory retention,

attention span, problem solving skills and executive functions. This supports the theoretical framework that yoga enhances neuroplasticity, increases blood flow to the brain, and improve neural connectivity, thereby improving mental clarity and academic abilities.[20]

From the study of Neuroplasticity, known as brain plasticity, refers to the brain's remarkable ability to reorganize itself by forming new neural connections throughout life. This adaptability allows neurons in the brain to compensate for injury, disease, and to adjust their activities in response to new situations or changes in the environment.[21]

Neurocognitive studies have demonstrated, different forms of yoga and different intensity of practice have particular effect in various brain region. The effect has been shown as an anatomical change in the frontal cortex, hippocampus, anterior cingulate cortex and insula in increase of gray meter volume, density and cortical thickness.[22] In another study where yogic practices shown to be effective in enhancement of connectivity between the pregenual anterior cingulate cortex, frontal medial cortex, posterior cingulate cortex and lateral occipital cortex. Anatomical changes, improvement of brain connectivity are closely related with learning, attention and problem-solving skills.[23]

Basic asanas primarily promote calmness, flexibility, and basic body awareness. These were effective in reducing anxiety, enhancing focus, and creating a positive mental state conducive to learning. The calming effects of these poses may have contributed to improved attention and short-term memory.[24] Advanced asanas, require greater physical control, coordination, strength, and concentration. The demand for intense focus and neuromuscular coordination likely stimulated higher cognitive processing areas, such as the prefrontal cortex. This may explain the superior gains in executive function and problem-solving observed in AG compared to BA and control group.[25]

Comparison between Basic and Advanced Asanas

One of the core aspects of this study was comparing the cognitive effects of basic and advanced asanas. Children in BG showed noticeable improvements in focus and task engagement. Basic asanas are generally more accessible, safer, and easier to integrate into school routines. The improvements can be attributed to their ability to promote physical stability, rhythmic breathing, and mental calmness without causing undue strain. The AG demonstrated comparatively greater gains in complex cognitive functions such as problem-solving, working memory, and multitasking. Advanced poses often demand heightened balance, core strength, and mind-body coordination, which may lead to stronger stimulation of brain regions responsible for cognitive control and executive functioning.

However, the advanced asana group also reported higher levels of initial physical fatigue and frustration, particularly in the early stages of the program, which may pose a challenge in maintaining motivation among younger or less physically adapted children.

Comparison with Previous Research

The results are in line with previous studies by Telles *et al.* (2013), which demonstrated that regular yoga practice, a combination of asana, pranayama and meditation, enhances attention span, memory retention along with academic performance in school-going children. However, this work adds a different comparative element by distinguishing between the impact of basic movement of asana and advanced movement of asana named Basic Asana and Advanced Asana, an area less explored in current literature.[6]

The factorial ANOVA analysis followed by post hoc comparison scores across the BG, AG and CG reveals that yogic asana intervention, particularly with advanced movement of Asana, has a significant positive effect on cognitive performance among school-children.

In the Raven's Progressive Matrices, which measures fluid intelligence, abstract reasoning and non-verbal intelligence, the AG showed a statistically significant improvement compared to BA ($p=0.001$) and CG ($p=0.009$). This suggests that advanced asanas may enhance better first thinking and new problem-solving abilities. The improvement will be reflected in their academic performance.

In the WISC, which evaluates general intellectual functioning, both the BG and AG groups demonstrated highly significant gains ($p < .001$), compared to the Control group. This indicates that even basic asanas can

substantially enhance overall intelligence and cognitive capacity, though advanced asanas may offer a greater margin of improvement.

In the Digit Span Test (DST), a measure of working memory and attention, again, both Basic and Advanced groups showed statistically significant post-test gains compared to the Control Group, with the Advanced group achieving the greatest improvement. The results reinforce that structured yogic practice enhances memory and attentional control.

Strengths and limitations

It was the first study to use both advanced and basic asanas as interventions to enhance general intelligence and memory in a specific age group of school children. Even the study has some limitations: Subjective elements (like motivation, instructor quality, and home environment) could influence results; Some cognitive parameters relied partly on self-assessments and teacher reports, which could introduce subjective bias; The outcome may have been influenced by the quality and consistency of yoga instruction, particularly for advanced postures.

Future scope:

Future research should investigate the long-term cognitive and academic impacts of continuous yoga practice. Include neuroimaging or neuropsychological tests for more objective measures of brain function changes. Explore gender differences or effects on specific learning disabilities like ADHD or dyslexia.

CONCLUSION

The study concludes that yoga interventions, especially those involving advanced asanas, significantly enhance cognitive performance among school children. Advanced yoga practices led to the greatest improvements in fluid inteligence (RPM), general intelligence (WISC), and working memory (DST), while basic asanas also showed notable gains in intelligence and attention. In contrast, the control group showed no improvement, underscoring the effectiveness of structured yoga in boosting cognitive abilities. These findings support integrating yoga, particularly advanced asanas, into educational programs to promote children's mental and academic development. Finally, the findings clearly demonstrate that yoga interventions significantly enhance cognitive learning in school children, with advanced asanas producing the most substantial gains across all measured variables. The lack of improvement in the control group further highlights the effectiveness of yoga-based cognitive training compared to no intervention. These results support the inclusion of yoga, particularly progressive and well-supervised advanced asanas, as part of holistic educational strategies aimed at improving mental and academic performance in children.

REFERENCES

1. Iyengar, B. K. S. (1966). *Light on yoga*. HarperCollins
2. Khalsa, S. B. S., & Butzer, B. Yoga in school settings: A research review. Frontiers in Psychology.2016, *7*, 1-6. https://doi.org/10.3389/fpsyg.2016.00037
3. Saraswati, S. S.. *Asana Pranayama Mudra Bandha* (4th ed.). 2006,Yoga Publications Trust.
4. Jarraya, S., Wagner, M., Jarraya, M., & Engel, F. A. Yoga in School Settings: A Research Review. Annals of Applied Sport Science.2019; *7*(4), 3-12.
5. Pandit DP, Upadhyah A, Goyal P, Sharma D. Effect of short term yoga on body weight, BMI, body fat percentage & blood pressure. Indian J Clin Anat Physiol.2019; 6, 179-182. doi.org/10.18231/j.ijcap.2019.040
6. Telles, S., Singh, N., & Puthige, R. (2013). Changes in Cognitive Performance Following a Yoga Intervention for Children. Journal of Child and Adolescent Behavior.2013; 1*(2),* 1-5.
7. Prakash, R. S., Voss, M. W., Erickson, K. I., & Kramer, A. F. Physical activity and cognitive vitality. *Annual review of psychology*.2015; *66*(1), 769-797.
8. Manjunath, N. K. Role of Yoga in Rehabilitation: Avenues and challenges. *International Journal of Yoga*.2024; *17*(3), 153-154.
9. Mohanty S, Pradhan B, Hankey A. Yoga Practices as an Alternative Training for Physical Fitness in Children With Visual Impairment. Adapt Phys Activ Q.2019; 36, 431-446. doi:10.1123/apaq.2018-0167 ; PMID: 31509796
10. Purohit SP, Pradhan B. Effect of yoga program on executive functions of adolescents dwelling in an orphan home: A randomized controlled study. J Tradit Complement Med.2016; 7:99-

105. Published 2016 Apr 20. doi:10.1016/j.jtcme.2016.03.001; PMID

11. Mohan, A., Sharma, R., & Bijlani, R. L. Effect of Yoga on Cognitive Functions: A Comprehensive Review. International Journal of Yoga. 2021;14(1), 27-34.

12. Snyder, S. M., Jones, J. R., & Geiger, L. A. Yoga, cognition, and executive functions: A systematic review. Journal of Physical Activity and Health. 2015; *12*(6), 844-853.

13. Rao S, Pal R. Exploring the Multidimensional Health Effects of Yogasana: A Comprehensive Overview. Intech Open, 2024. DOI: 10.5772/intechopen.1005096

14. Kaur M, Bhat A. Creative Yoga Intervention Improves Motor and Imitation Skills of Children With Autism Spectrum Disorder. Phys Ther.2019; 99,1520-1534. doi:10.1093/ptj/pzz115; PMID: 31765484

15. Streeter, C. C., Gerbarg, P. L., Saper, R. B., Ciraulo, D. A., & Brown, R. P. Effects of yoga on the autonomic nervous system, gamma-aminobutyric acid, and allostasis in epilepsy, depression, and post-traumatic stress disorder. Medical Hypotheses.2012; 78(5), 571-579. https://doi.org/10.1016/j.mehy.2012.01.021

16. Gothe, N. P., Khan, I., Hayes, J., Erlenbach, E., & Damoiseaux, J. S. (2019). Yoga effects on brain health: A systematic review of the current literature. Brain Plasticity.2019; 5*(1),* 105-122. https://doi.org/10.3233/BPL-190084

17. J. Raven, The raven progressive matrices: a review of national norming studies and ethnic and socioeconomic variation within the United States, J. Educ. Meas.1981; 26 (1) (1989 1–16, https://doi.org/10.1111/j.1745-3984.1989.tb00314.x.

18. Watkins, M. W., Canivez, G. L., Dombrowski, S. C., McGill, R. J., Pritchard, A. E., Holingue, C. B., & Jacobson, L. A. . Long-term stability of Wechsler Intelligence Scale for Children-fifth edition scores in a clinical sample. Applied neuropsychology. Child. 2022; *11*(3), 422–428. https://doi.org/10.1080/21622965.2021.1875827

19. Shetty, L., Reddy, G. G., Krishnan, P., Toby, I., & Ts, S. . Effects of Yoga on Cognitive Functions Among Adolescents. *Advances in mind-body medicine*.2022; *36*(2), 4-7.

20. Munn, F. (2023. Teen yoga: How it benefits your brain. *Frontiers for Young Minds. 2023; 8*, Article 112345. https://doi.org/10.3389/frym.2023.112345

21. Pascual-Leone, A., Amedi, A., Fregni, F., & Merabet, L. B. The plastic human brain cortex. *Annual Review of Neuroscience*.2005; 28, 377–401. https://doi.org/10.1146/annurev.neuro.27.070203.144216

22. Garner M, Reith W, Krick C, Garner M. 10-Week Hatha Yoga Increases Right Hippocampal Density Compared to Active and Passive Control Groups: A Controlled Structural cMRI Study. 2019;1–11.

23. Gothe, N. P., Khan, I., Hayes, J., Erlenbach, E., & Damoiseaux, J. S. . Yoga effects on brain health: a systematic review of the current literature. Brain Plasticity.2019; 5(1), 105-122

24. Telles, S., Singh, N., & Balkrishna, A. Managing mental health disorders resulting from trauma through yoga: A review. *Depression Research and Treatment*, 2012, Article ID 401513. https://doi.org/10.1155/2012/401513

25. Gothe, N. P., Khan, I., Hayes, J., Erlenbach, E., & Damoiseaux, J. S. (2019). Yoga effects on brain health: a systematic review of the current literature. Brain Plasticity.2019; 5(1), 105-122.