

Research Paper

Effects of Ānāpāna Meditation on The Sustained Attention Span of Students from the Middle School

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ABSTRACT

This study investigates the effect of Ānāpāna Meditation on improving sustained attention in middle school students. A total of 505 CBSE class 6th and 7th students were involved, with 271 receiving parental consent for participation, while 234 were excluded due to lack of consent. Students in the experimental group practiced 10 minutes of Ānāpāna Meditation during a separate assembly, whereas the control group attended regular assemblies. The research employed a pre-test and post-test design, using the Number Cancellation Test (NCT) to assess attention. Measurements were taken at three intervals: before the intervention, after 3 months, and after 6 months. The final analysis included 453 students (245 experimental, 208 control), excluding any outliers and incomplete data. Results revealed significant improvements in NCT scores for the experimental group, with a moderate effect size of 0.39. Scores increased by 3.61 after 3 months and by 16.47 after 6 months ($p < 0.05$). These findings suggest that Ānāpāna Meditation positively influences sustained attention among middle school students.

Keywords: Sustained attention span, Ānāpāna Meditation, Middle School

Attention span is an individual's ability to focus on any stimulus or an object without getting distracted (Elizabeth Levin et al., 2011). Attention refers to a process; about prioritisation and selection, and focusing on a selected object in a given time. This selection can be of items from the external inputs or from the internal mental landscape. This is a focus on one object, inhibiting distracting inputs, and guiding adaptive behaviour. Attention is essential for normal healthy cognition (avoiding the confused, dazed, scatter-brain state) (Anna C. Nobre, 2018). The process helps in creating impressions on the mind with the help of information procured. It helps brain in inhibiting distractions, attend to selected thing and try to complete the work (Kendra Cherry, 2022).

REVIEW OF LITERATURE

Attention is a very important brain activity which is a main factor at various stages of life, including individual achievements at different stages, and social relationships (Best, J. R., et al., 2009). Different types of attentions which are studied like focused, shifting, and divided

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(Best, J. R., et al., 2009). An ability of an individual to keep discreet focus on any object over a long time is called sustained attention (Cohen, R. A., 2014).

Number of neurocognitive factors are contributing to attention alterations, which possibly can result in states of being "in the zone" or "out of the zone," (Easterman et al., 2019). Research has shown that lack of sustained attention is commonly seen in childhood and adolescence. Sustained attention which is very important for intellectual and socio-emotional development (Döpfner et al., 2008). Sustained attention span is impacted by number of psychological, environmental, and biological factors, such as attention-deficit/hyperactivity disorder (ADHD), anxiety, and depression.

Problems in earlier life carries its impressions on cognitive and socio-emotional outcomes in later life. The development of mental skills like working memory, flexible thinking, self-control, planning and organization includes sustained attention span (McClelland et al., 2006; McClelland et al., 2000, Shonkoff & Phillips, 2000). A research finding showed that sustained attention span improves approximately till the age of 10 yrs there after the plateau is seen in the same area of cognitions (Jennifer Betts et al., 2009).

ADHD is an outcome of inability to keep attention on an object without distraction for a long time. It is also found that ADHD is one of the reasons of academic underachievement, especially related to languages and in working with numbers (Duncan et al., 2007). Therefore, it is essential to understand the role of sustained attention from every aspect of development. It is required to develop effective programme to encourage working on attentional skills across the lifespan.

Meditation technique of Mindfulness and yoga also employed as intervention techniques for addressing intellectual, mental and emotional issues. Some suggested methods for enhancing attention include valuing attentiveness, living in the present moment, being more aware, noticing small details, setting goals and monitoring progress, identifying attention targets, eliminating distractions, avoiding multitasking, combating boredom, utilizing emotions effectively, practicing attentiveness, and learning to meditate (William R. Klemm, 2011). Research finding suggests that improvement in working on inhibitions observed with four days of meditation training, with benefits previously reported in long-term meditators (Fadel Zeidan et al., 2010).

A randomized control group study with the participants aged 18 to 45, practicing brief, daily meditation for eight weeks, indicated a decrease in mood disturbances and improvements in attention, working memory, and recognition memory (Basso J. C. et al., 2016). A meta-analysis review of thirty-three RCT studies on mindfulness-based interventions (MBI) showed positive impact on students' behaviour, brain abilities, and wellbeing (Dunning et al., 2019). The study shows brain related and tangible activities are two promising non-pharmaceutical approaches to enhance attention abilities. Cognitive-physical, closed-loop electronic games (body-brain trainer or 'BBT') were also evaluated for their attention benefits (Anguera J. A. et al., 2023).

Computer-assisted instructions have also been used to improve the attention of children with an average age of 12.4 years (Navarro J. I. et al., 2003). Numerous studies have shown that mindfulness techniques can reduce anxiety and stress levels (Hyseni Duruka et al., 2023; Huberty et al., 2019; Breedvelt et al., 2019; David Creswell, 2019). Mindfulness has also

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been studied as an intervention for memory, attention, and emotional regulation (*Basso et al., 2019*).

After studying various researches on the sustained attention span; with different age groups and techniques used to improve it, a need is felt to introduce a technique which is simple can be followed and practiced easily without any external device, scientific, and has a global approach to the students at an early age. Ānāpāna meditation as given in the literature found to be easy to understand and practice, even at middle school level.

This study examines the use of Ānāpāna Meditation to enhance sustained attention span. Vipāssanā, one of the oldest meditation forms, was rediscovered by Gotama, the Buddha, 2500 years ago (*Vipāssanā Research Institute*). According to Radhi Raja (2002), the teachings of the Buddha can offer significant benefits to people of all ages, especially when learned at a younger age. The initial step in practising Vipāssanā meditation is Ānāpāna, which involves observing the natural breath. This straightforward, objective, and scientific method aids in improving attention and concentration. Ānāpāna also helps students manage anxiety, tension, and fear during puberty (*What is Ānāpāna? | Vipāssanā Research Institute*). A study by Bhutekar et al. (2019) on adolescents found that using Ānāpāna meditation as an intervention reduced stress levels and positively impacted learning.

Participants

Students from grades 7 and 8 at Jai Gopal Garodia Rashtrorothana Vidya Kendra, Rammurthy Nagar, Bengaluru, participated in the study. Prior consent forms were sent to parents. Out of 505 students from both grades, 271 parents consented to their children's participation, while 234 parents did not provide consent.

Inclusion Criteria:

1. Students from 7th and 8th grades were included.
2. Parental consent was required for participation.
3. Both boys and girls from the specified grades were included in the study.

Exclusion Criteria:

1. Students from 6th grade were excluded due to space limitations (although class 6 is a part of middle school according to NEP2020).
2. Students other than those in middle school were not included.
3. Students from 7th and 8th grades whose parents did not provide consent were excluded.

Design

A convenience sample design with a two-group pre- and post-test method was employed. All 505 students were administered the NCT with 2 digits for cancellation as a pre-test. Included students (271) participated in daily Ānāpāna meditation practice for 10 minutes during the school assembly, while excluded students continued regular school activities. After three months (72 sessions) of Ānāpāna meditation practice, an intermediate NCT was administered to all 505 students. The practice continued for another three months (49 sessions), followed by a post-test NCT for all 7th and 8th-grade students.

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Intervention:

Ānāpāna Meditation, as taught by S. N. Goenka, was selected for the intervention. The MITRA Upakram recordings from the Vipāssanā Research Institute, Pune, were used for both the introduction and regular practice. MITRA Upakram introduces Ānāpāna meditation to students starting from 5th grade. The introduction was done initially in four sessions, each lasting 15 minutes. Ānāpāna Meditation was conducted every working day during the school assembly, with interactive sessions held once a week to address any doubts and encourage students to continue their practice.

ANALYSIS AND INTERPRETATION OF DATA

Results:

A total of 505 students comprising 271 in the meditation group and 234 in the control group are considered for the study. NCT scores of 453 students comprising 245 students in the meditation group and 208 students in the control group were considered for analysis after eliminating the outliers and the missing scores. The results of NCT scores of meditation and control groups are tabulated in Table 1. The main effects of NCT scores have shown statistically significant differences ($F(2,876.8) = 299.91, p < 0.05$) across pre-, intermediate and post-data with an effect size of 0.39. There was a non-significant interaction ($F(2, 876.8) = 0.66, p > 0.05$) between NCT scores and groups, as shown in Fig 2.

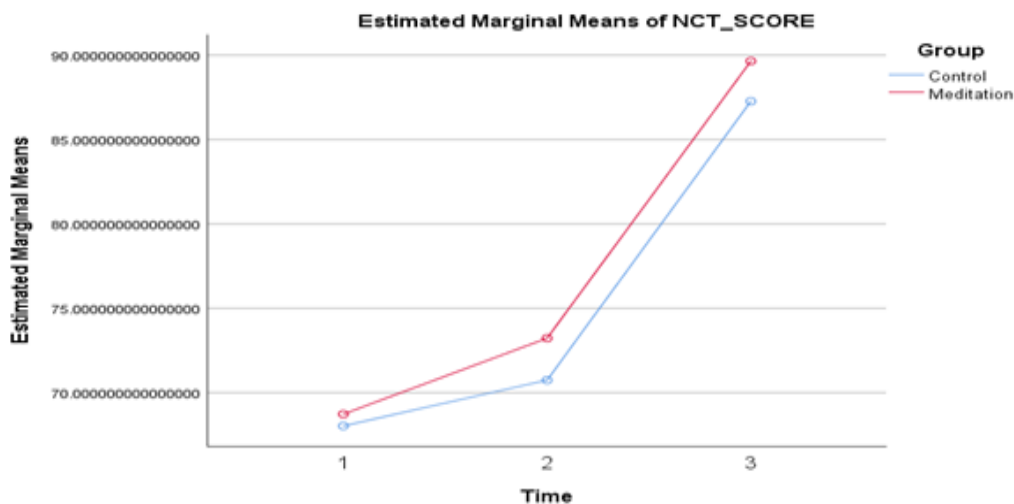


Fig 1: Interactions between NCT Scores vs Groups

Table 1 NCT Scores before, middle and after intervention

Group	N (Total)	Pre-score	Mid-score	Post-score
Intervention Group / Meditation Group	245(271)	68.73 ± 19.35	73.23±16.28	89.65±20.79
Control Group	208(235)	68.03±19.23	70.75±16.05	87.27±21.39

Data are shown as mean ± standard deviation.

NCT: Number Cancellation Test

N: Number of NCT scores considered for the study after eliminating outliers; Total: Number of students who participated in the study

Effect Size is computed as the Sum of squares of conditions / (Sum of squares of conditions + Sum of squares of error)

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As the main effects were statistically significant without any significant interactions between NCT scores and Groups, post-hoc analysis was done using Bonferroni correction. The post hoc analysis has shown statistically significant differences across pairwise comparisons. NCT score has increased by 3.61 on average ($p < 0.05$) after 3 months of intervention and it has increased further by 16.47 on average ($p < 0.05$) after another 3 months of intervention as shown in Fig 1. NCT Score has shown significant improvement in the second half compared to first half as shown in Fig 2.

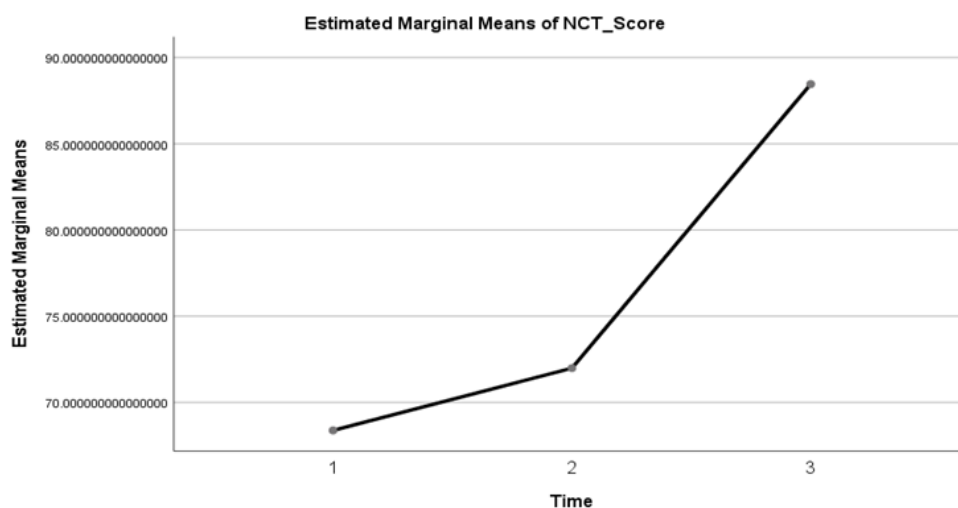


Fig 2: NCT Scores of Pre, Intermediate and Post-intervention

DISCUSSION

According to this study, students who practised Ānāpāna Meditation for six months showed improvement in keeping their attention longer on the object. The object given to the students was the breath. Students were trained to keep watch on each inhale and exhale i.e focus on their natural breath without manipulation. While observing inhaling and exhaling, students could feel the touch of air at the entrance of their nostrils or sense the temperature variance while inhaling and exhaling. This method involves training the mind to be on one object at a time and being vigilant about the object without distraction. Ten minutes of daily practice helped students develop a habit of keeping their attention on a single object without distractions, which subsequently improved their NCT scores.

Various factors contributing to sustained attention span have been studied across different age groups. In an earlier study, long-term physical exercise as an intervention was found to be generally beneficial for adolescent students' attention, with the greatest effects observed in the coordination exercise group (Altermann et al., 2023). Integrated cognitive and physical activity, video game training has been used to improve the focus on certain objects inhibiting others (Anguera et al., 2023). Adequate sleep is another factor studied for its impact on cognitive functions, including attention (Dahl, 1996). Focus training strategies and meditation were also tested for their contribution to attention (Chang et al., 2021). In recent years most commonly studied technique to improve attention and neural activities is Mindfulness (Zeiden et al., 2019; Posner et al., 2015; Lin et al., 2019; Prakash et al., 2019; Basso et al., 2019; Yakobi et al., 2021). In the present study, the effectiveness of Ānāpāna Meditation in improving sustained attention span is reflected in the NCT scores.

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The analysis showed an increase in NCT scores even in the control group that did not receive the intervention. Competition can enhance attention in physical tasks (*Dimenichi et al., 2015*). Since the NCT was administered to the entire class regardless of experimental or control group status, there was a possibility of creating competition among students to complete the test faster and with more correct cancellations. In one of the longitudinal studies on 435 urban children, researchers found that the most rapid change in attention occurred between ages 8–10 years, with more gradual changes occurring between ages 10–13 years (*Rebok et al., 1997*).

Ānāpāna Meditation, as described in the literature, is a simple meditation technique that can be taught to children above 10 years of age (What is Ānāpāna? Vipassanā Research Institute). The significant difference in NCT scores, indicating improved sustained attention span in meditators compared to non-meditators (control group), suggests that Ānāpāna Meditation has helped improve the sustained attention span of middle school students.

Limitations of the Study

1. There was no randomized control group for the study.
2. Ānāpāna meditation cannot be taught to children below 10 years of age.
3. Children with special needs require special assistance to sit for a certain period and understand instructions.

Further Suggestions

1. A study with a randomized control group can be undertaken.
2. Further investigation is needed to assess the increase in sustained attention span among control group children without intervention.
3. Gender differences in attention span should be studied in detail.

CONCLUSION

Based on the NCT scores, a significant improvement in sustained attention span was observed among students from 7th and 8th grades in a CBSE school who practiced Ānāpāna Meditation for 10 minutes every day for six months, compared to the control group who did not receive any intervention.

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Conflict of Interest

There is no conflict of interest in publication of this paper.

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