



Attention Deficit Hyperactivity Disorder and Various Interventions: Yoga, Medication, Homeopathy, Massage Therapy and Green Space Settings

KEYWORDS

Attention deficit hyper activity disorder (ADHD), Yoga, meditation, medication and alternative therapies.

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ABSTRACT ADHD is the biggest issue in current situations not only worldwide but as well in Indian context. The popular methods used in management of ADHD are psychiatric and psychotherapies but therapeutic intervention like yoga, homeopathy, massage therapy and green space settings are not been given much emphasis, thus the present research aims at meta analysis to find out the implication of alternative interventions and medication for successful management of ADHD. The result concluded that, yoga and meditation increases the short and long term span of attention on ADHD children. Medication shows positive effect on symptomatic aspects of ADHD in long term. Homeopathy shows positive result on cognitive aspect of ADHD in long term. The massage shows positive effect on task focus and group behavior but longevity is yet to confirm thus the analysis concludes that alternative and multiple intervention helps in effective management of ADHD.

Introduction

Attention deficit hyperactivity disorder (ADHD) is one of the most common childhood disorders and can continue through adolescence and adulthood. ADHD is a neurobehavioral developmental disorder among school-age children, affecting about 8-12% of children world-wide. (Faraone SV et al 2003) An epidemiological study by Srinath et al (2005), showed the prevalence of ADHD to be 1.6% among children less than 16 years, posing costly demands on medical, psychological and societal resources in India. The child with ADHD will have difficulty in concentrating on a task, at home and school. This, predictably, leads to considerable distress among the care givers. (Musa RS et al 2007)

Yoga and ADHD

There are relatively two studies on meditation techniques applied to childhood AD/HD. Results to date have been mixed with one study indicating improvement in parent ratings of impulsivity and improved performance on an attentional measure (Kratzer J. 1983) and another indicating improved classroom behavior in the absence of parent reported improvement. (Moretti-Altuna G.1987)

A study done by Jensen PS & Kenny DT (2004) evaluated the use of yoga as a complementary treatment to medication in reducing the behavioral and attention deficit symptoms. The study found that despite randomization, there were significant differences between the control and yoga groups.

Harrison, et al(2004) conducted a study to determine the benefit of Sahaja Yoga Meditation (SYM) on improving stability of attention and concentration, motor activity, problems of inhibition, easily frustrated mood, poor self-esteem and difficulties at school of children with ADHD. The study found that participants showed a marked improvement in ADHD symptoms. Improvement in behavior may have been due to medication the children were receiving, rather than the SYM program or from parents seeing the change they were expecting.

The study of mindfulness meditation in adults conducted by Monastra V. (2008) has suggested that it may have beneficial effects on cognitive activities such as shifting set and possibly, in improving working memory. Mindfulness meditation involves

training people to be observers of their ongoing thoughts and feelings without attempting to change these internal experiences.

A study conducted by V.R. Hariprasad et al (2013), children between 5 and 16 years of age diagnosed with ADHD and co-operative for yoga were included. And result founded total of 9 children were recruited into the study. All, but one were on medications. There was a significant improvement seen in the ADHD symptoms at the time of discharge.

Meera Balasubramaniam et al (2013) examined the evidence for efficacy of yoga in the treatment of selected major psychiatric disorders. Evidence supporting a potential acute benefit for yoga exists in ADHD; they reported post-intervention improvement in scores. Evidence supported a potential acute benefit for yoga exists in depression, as an adjunct to pharmacotherapy in schizophrenia, in children with ADHD, and Grade C evidence in sleep complaints.

The meta analysis in reference of Yoga and Meditation thus indicate analysis of seven studies to assess the effectiveness of meditation therapies as a treatment for ADHD. Two studies used meditation while the other four used yoga compared with drugs, relaxation training, non-specific exercises and standard treatment control and one study used Sahaj Yog Meditation technique. The adverse effects of meditation have not been reported in any study, rather than all studies shown positive trend towards attention related problems, sleep disorders and ADHD. Three studies out of eight also used medication with Yoga, than role of medication can't be ignored.

Medication and ADHD

The MTA Cooperative Group (1999) conducted the largest, most rigorous clinical trial of ADHD treatment to date (the Multimodal Treatment study of ADHD) founded that stimulant treatment was associated with immediate post-treatment improvements in reading and mathematics achievement test scores, along with clinical improvement. However, the academic gains were lost at the 3-year naturalistic follow-up (Jensen PS et al -2007), and importantly, only 32.5 % of the original 579 patients enrolled in the study were still in treatment with stimulants at the 8-year follow-up (Molina BS et al- 2009).

Pietrzak et al (2006) reviewed 40 placebo-controlled MPH treatment studies of ADHD children reported since 1993, which indicated that 62.5 % of these studies found significant improvements in 1 or more cognitive processes with MPH treatment. Improvements on saccadic eye movement, planning and cognitive flexibility, attention/vigilance, and inhibitory control were each found in at least 70 % of the original reports that assessed these particular cognitive functions. Long-term memory and working memory/divided attention improvements were noted in 58 % and 50 % of the studies, respectively. Among these reports, higher doses of MPH (when compared in individual studies to lower doses) generally conferred greater improvements on tasks of attention/vigilance, and working and long-term memory, but not in planning/cognitive flexibility, inhibitory control, or motor speed. The long-term effects of stimulant treatment on cognition in ADHD patients are comparatively more complex and inconsistent.

Other studies have found that with a period of time, those ADHD patients who remain on stimulant medications may show improved sustained attention and verbal learning (Biederman J et al, 2008), and advantages in academic achievement (Power RL et al, 2008). However, these are relatively smaller studies with self-selected patients in naturalistic longitudinal treatment designs. Some observers have concluded that while ADHD medications improve short-term academic performance of children with ADHD, they may not have lasting effects on long-term academic achievement, as measured with standardized achievement tests or rates of grade failure (Advokat c. 2010). It is also important to note that there may be a divergence of goals with clinical versus cognitive improvement, as the doses used by clinicians to manage the classroom behavior of a child may be suboptimal (or even deleterious) for cognition (Gadow KD, 1983 & Swanson et al, 1991). An important, relatively recent, innovation in clinical study design that can rigorously address this issue involves the use of analog classroom paradigms as experimental settings to study ADHD treatment effects. These studies permit controlled observation periods for up to 12 to 14 h, and have shown clear dose-dependent benefits for concurrent overt behavior and mathematics performance with 1-to-5-week treatment courses with mixed amphetamine salts (Mc Cracken JT et al, 2003), methylphenidate (Mc Gough JJ et al, 2006) or lis-dexamphetamine [a d-amphetamine pro-drug that is activated with intestinal and/or hepatic biotransformation] (Biederman J et al, 2007). Among adults with ADHD, a naturalistic study of young adults found that stimulants improve sustained attention and verbal learning (Biederman J et al, 2008); otherwise, the evidence that stimulant treatment improves cognition and/or academic achievement in college students or adults with ADHD is inconsistent (Advokat C, 2010).

The potential for ADHD medications to improve cognition and academic achievement in adults with ADHD remains understudied. In particular, whether these medications can positively impact academic outcome or improve cognition among adults who experience persisting ADHD in the face of a ubiquitous age-related cognitive decline throughout the adult years, there pose important questions deserving further rigorous research. The use of novel measures of cognitive task performance is gaining favor as an important methodological innovation in evaluating drug effects on cognition.

Despite the uncertainty of the long-term effects of stimulant medications on cognitive function and academic achievement, there is promising evidence that these medications have positive effects on brain structure in ADHD. Medicated ADHD patients, compared to well-matched undedicated ADHD patient groups, have significantly larger (i.e., more normal) volumes of

the basal ganglia (Sobel LJ et al, 2010), right anterior cingulate gyrus (Semrud- Clikman M et al, 2006), posterior inferior vermis of the cerebellum (Bledsoe J et al, 2009) and total white matter (Castellanos FX et al, 2002) and increased cortical thickness (Shaw P et al, 2006 & Shaw P et al, 2007). In addition, recent meta-analyses support the notion that stimulant treatment is associated with normalization of basal ganglia volumes (Frod T et al, 2012 & Nakao T et al, 2011). Although these studies are cross-sectional in design, they are strongly suggestive that stimulant medication treatment can remediate the gross structural brain abnormalities found in this condition.

After analyzing 24 studies to assess the effectiveness of medication therapies as a treatment for ADHD. All studies were found longitudinal nature studies and mainly stimulants are used for therapeutic intervention. The adverse effects of medication have been reported in eight studies out of twenty four. Other sixteen studies shows positive trend towards ADHD symptoms in longer way, no effect shows in short term.

Homeopathy and ADHD

Heirs M et al (2009) located four studies meeting their criterion of random or quasirandom assignment. The active treatments were either verum or mixtures of homeopathic substances including selenium and sodium phosphate. There was no evidence that homeopathic treatment was effective in reducing symptoms as reported on parent-completed behavioral rating scales or cognitive tasks. Frei and Colleagues (2005) who conducted one of the trials, raised questions about the adequacy of evaluating outcomes based only on several months of treatment. They noted that homeopathic treatments required an average of 6.5 months to reduce symptoms by 50%. Frei and colleagues (2006) also found that children treated with methylphenidate responded more slowly to homeopathic treatment even after stimulant medication had been discontinued.

After meta analysis, three studies to assess the effectiveness of homeopathy therapy as a treatment for ADHD. The adverse effects of homeopathy medicines have not been reported in any study. One study out of three shows, there was no evidence that homeopathic treatment was effective in reducing symptoms as reported on parent-completed behavioral rating scales or cognitive tasks. But other two studies shows positive result on ADHD symptoms in longer run (more than 6.5 months). More trials are needed in this field.

Massage and ADHD

Field TM et al (1998), Field TM et al (1995), Khilnani S et al (2003) & Suess PE et al (1994) examined the impact of therapeutic massage on adolescents with AD/HD. While the rationale for this therapy has not been well articulated, there is evidence that massage increases EEG patterns associated with attention as well as vagal ton. Increased vagal cardiac control may mediate increased motor inhibition.

A randomized controlled trial indicated that adolescents receiving weekly or biweekly massage therapy demonstrated improved mood as well as teacher rated classroom behavior. In addition, students with AD/HD were found to have significantly improved task focus—moving from being on task 47% of the time to 75% at the end of ten consecutive school days of 15-minute massage sessions. The length of the intervention—a total of 10 days to four weeks—is unlikely to have enduring benefits after regular massage has ended. Additionally, in the few studies conducted, medication status was unclear.

Green Space and ADHD

Van den Berg AE et al (2007) worked on ADHD children with green space setting. Green Space is the term used to describe

a natural green setting including trees and grass. Green space exposure as a form of treatment is based on Attention Restoration Theory (ART). ART posits attention, involuntary and voluntary. Attention deficit stems from overtaxed or fatigued voluntary attention. With voluntary attention demands are greater; sustaining attention becomes more effortful and ineffective. As with rest or sleep, activities that draw upon involuntary attention permit voluntary attention to recover. ART adherents believe that different types of environment have differential effects on attention. Those environments, such as the classroom requiring more effortful forms of attention, are fatiguing. In contrast, outdoor environments with green space are gently absorbing and draw upon involuntary attention while restoring voluntary attention.

Kuo FE & Faber Taylor (2004) published a survey; parents of children with ADHD reported greater symptom improvement after children participated in activities in "natural" settings versus indoor or artificially built outdoor settings such as cement playgrounds. Faber Taylor A & Kuo FE (2009) recent study found that children with ADHD performed better on a verbal task sensitive to concentration after taking a walk in a park ver-

sus a residential or downtown setting. Effect sizes were comparable to those associated with methylphenidate treatment. While interesting, there are little data to indicate the duration of green space exposure required or the duration of improved cognitive functioning after exposure.

Conclusion

The meta analysis done on deferent therapeutic interventions on ADHD concluded that, yoga and meditation shows positive result on ADHD and attentional measures in short term and long term both. Medication shows positive effect on symptomatic aspects of ADHD in long term, some adverse effects also shows. Homeopathy shows positive result on cognitive era of ADHD in long term. The massage shows positive effect on task focus and group behavior but permanent effect doesn't shows. Green space setting shows positive result on ADHD symptoms. Thus the analysis concludes that alternative and multiple intervention helps in effective management of ADHD. Further studies should be conducted to conform this experimentally and combined intervention models should be tested for management of ADHD.

REFERENCE

- Advokat, C. (2010). What are the cognitive effects of stimulant medications? Emphasis on adults with attention-deficit/hyperactivity disorder (ADHD). *Neurosci. Biobehav. Rev.* 34, 1256–1266. doi: 10.1016/j.neubiorev.2010.03.006 | American Psychiatric Association. Text Revision. 4th ed. Washington, DC: American Psychiatric Association; 2000. Diagnostic and Statistical Manual of Mental Disorders. | Biederman J, Boellner SW, Childress A, Lopez FA, Krishnan S, Zhang Y. 2007. Lisdexamfetamine dimesylate and mixed amphetamine salts extended-release in children with ADHD: a double-blind, placebo-controlled, crossover analog classroom study. *Biol Psychiatry.* 2007;62:970–976. doi: 10.1016/j.biopsych.2007.04.015. | Biederman J, Seidman LJ, Petty CR, et al. 2008. Effects of stimulant medication on neuropsychological functioning in young adults with attention-deficit/hyperactivity disorder. *J Clin Psychiatry.* 2008;69:1150–1156. doi: 10.4088/JCP.v69n0715. | Bledsoe J, Semrud-Clikeman M, Pliszka SR. 2009. A magnetic resonance imaging study of the cerebellar vermis in chronically treated and treatment-naïve children with attention-deficit/hyperactivity disorder combined-type. *Biol Psychiatry.* 2009;65:620–624. doi:10.1016/j.biopsych. | Castellanos FX, Kelly C, Milham MP. 2009. The restless brain: attention-deficit hyperactivity disorder, resting-state functional connectivity, and intrasubject variability. *Can J Psychiatry.* 2009;54:665–672. | Castellanos FX, Lee PP, Sharp W, et al. 2002. Developmental trajectories of brain volume abnormalities in children and adolescents with attention-deficit/hyperactivity disorder. *JAMA.* 2002;288:1740–1748. doi: 10.1001/jama.288.14.1740. | DSM-IV-TR workgroup. The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision. Washington, DC: American Psychiatric Association. | Epstein JN, Conners CK, Hervey AS, et al. Assessing medication effects in the MTA study using neuropsychological outcomes. *J Child Psychol Psychiatry.* 2006;47:446–456. doi: 10.1111/j.1469-7610.2005.01469.x. | Faber Taylor A, Kuo FE. 2009. Children with attention deficits concentrate better after walk in the park. *Journal of Attention Disorders.* 2009;12(5):402–409. | Faraone SV, Sergeant J, Gillberg C, Biederman J. 2003. The worldwide prevalence of ADHD: Is it an American condition? *World Psychiatry.* 2003;2:104–113. | Field T, Pickens J, Fox N, Nawrocki T, Gonzalez J. 1995. Vagal tone in infants of depressed mothers. *Development and Psychopathology.* 1995;7(2):227–231. | Field TM, Quintino O, Hernandez-Reif M, Koslowsky G. 1998. Adolescents with attention deficit hyperactivity disorder benefit from massage therapy. *Adolescence.* 1998;33(129):102–108. | Frei H, Thurneysen A, Von Ammon K. 2006. Methodological difficulties in homeopathic treatment of children with ADD/ADHD. *Journal of Alternative and Complementary Medicine.* 2006;12(2):p. 104.[PubMed] | Frodt T, Skokauskas N. 2012. Meta-analysis of structural MRI studies in children and adults with attention deficit hyperactivity disorder indicates treatment effects. *Acta Psychiatr Scand.* 2012;125:114–126. doi: 10.1111/j.1600-0447.2011.01786.x. | Gadwo KD. 1983. Effects of stimulant drugs on academic performance in hyperactive and learning disabled children. *J Learn Disabil.* 1983;16:290–299. doi: 10.1177/002221948301600509. | Harrison LJ, Manocha R, Rubia K. 2004. Sahaja Yoga Meditation as a family treatment programme for children with attention deficit-hyperactivity disorder. *Clinical Child Psychology and Psychiatry.* 2004;9(4):479–497. | Heirs M, Dean ME. 2009. Homeopathy for attention deficit/hyperactivity disorder or hyperkinetic disorder (Review) *The Cochrane Library.* [PubMed] | Jensen PS, Arnold LE, Swanson JM, et al. 2007. 3-year follow-up of the NIMH MTA study. *J Am Acad Child Adolesc Psychiatry.* 2007;46:989–1002. doi: 10.1097/CHI.0b013e3180686d48. | Jensen PS, Kenny DT. 2004. The effects of yoga on the attention and behavior of boys with attention-deficit/hyperactivity disorder (ADHD). *J Atten Disord.* 2004;7:205–16. | Johnson KA, Barry E, Bellgrove MA, et al. 2008. Dissociation in response to methylphenidate on response variability in a group of medication naïve children with ADHD. *Neuropsychologia.* 2008;46:1532–1541. doi: 10.1016/j.neuropsychologia.2008.01.002. | Khilnani S, Field T, Hernandez-Reif M, Schanberg S. 2003. Massage therapy improves mood and behavior of students with attention-deficit/hyperactivity disorder. *Adolescence.* 2003;38(152):623–638. | Kratter J. 1983. The use of meditation in the treatment of attention deficit disorder with hyperactivity. *Dissertation Abstracts International.* 1983;44:p. 1965. | Kuo FE, Faber Taylor A. 2004. A potential natural treatment for attention-deficit/hyperactivity disorder: evidence from a national study. *American Journal of Public Health.* 2004;94(9):1580–1586. | McCracken JT, Biederman J, Greenhill LL, et al. 2003. Analog classroom assessment of a once-daily mixed amphetamine formulation, SLI381 (Adderall XR), in children with ADHD. *J Am Acad Child Adolesc Psychiatry.* 2003;42:673–683. doi: 10.1097/01.CHI.0000046863.56865.FE. | McGough J, McCracken J, Swanson J, Riddle M, Greenhill L, Kollins S, Greenhill L, Abikoff H, Davies M, Chuang S, Wigal T, Wigal S, Posner K, Skrobala A, Katicic E, Ghouman J, Cunningham C, Shigawa S, Moyzis R, Vitiello B. 2006 Nov. Pharmacogenetics of methylphenidate response in preschoolers with attention-deficit/hyperactivity disorder. *Journal of the Academy of Child and Adolescent Psychiatry.* 2006 Nov; 45(11):1314–1322. | McGough JJ, Wigal SB, Abikoff H, Turnbow JM, Posner K, Moon E. 2006. A randomized, double-blind, placebo-controlled, laboratory classroom assessment of methylphenidate transdermal system in children with ADHD. *J Atten Disord.* 2006;9:476–485. doi: 10.1177/1087054705284089. | Meera Balasubramanian, Shirley Telles, and P. Murali Doraiswamy. Yoga on Our Minds: A Systematic Review of Yoga for Neuropsychiatric Disorders. *Front Psychiatry.* 2012; 3: 117, Published online 2013 January 25. Prepublished online 2012 October 12. | Molina BS, Hinshaw SP, Swanson JM, et al. 2009. The MTA at 8 years: prospective follow-up of children treated for combined-type ADHD in a multisite study. *J Am Acad Child Adolesc Psychiatry.* 2009;48:484–500. doi: 10.1097/CHI.0b013e31819c23d0. | Monasta V. 2008. Unlocking the Potential of Patients with ADHD: A Model for Clinical Practice. Washington, DC, USA: American Psychological Association. | Moretti-Altuna G. 1987. The effects of meditation versus medication in the treatment of attention deficit disorder with hyperactivity. *Dissertation Abstracts International.* ; 47:p. 4658. | Musa RS, Shafiee Z. 2007. Depressive, anxiety and stress levels among mothers of ADHD children and their relationships to ADHD symptoms. *ASEAN J Psychiatry.* 2007;8:20–8. | Nakao T, Radau J, Rubia K, Mataix-Cols D. 2011. Gray matter volume abnormalities in ADHD: voxel-based meta-analysis exploring the effects of age and stimulant medication. *Am J Psychiatry.* 168:1154–1163. | Peck, H., Kehle, T., Bray, B., & Theodore, L. (2005). Yoga as an intervention for children with attention problems. *School Psychology Review.* 34 (3), 415–424. | Pietrzak RH, Mollica CM, Maruff P, Snyder PJ. 2006. Cognitive effects of immediate-release methylphenidate in children with attention-deficit/hyperactivity disorder. *Neurosci Biobehav Rev.* 2006;30:1225–1245. doi: 10.1016/j.neubiorev.2006.10.002. | Powers RL, Marks DJ, Miller CJ, Newcorn JH, Halperin JM. 2008. Stimulant treatment in children with attention-deficit/hyperactivity disorder moderates adolescent academic outcome. *J Child Adolesc Psychopharmacol.* 2008;18:449–459. doi: 10.1089/cap.2008.021. | Semrud-Clikeman M, Pliszka SR, Lancaster J, Liotti M. 2006. Volumetric MRI differences in treatment-naïve vs chronically treated children with ADHD. *Neurology.* ; 67:1023–1027. doi: 10.1212/01.wnl.0000237385.84037.3c. | Shaw P, Eckstrand K, Sharp W, et al. 2007. Attention-deficit/hyperactivity disorder is characterized by a delay in cortical maturation. *Proc Natl Acad Sci USA.* ; 104:19649–19654. doi: 10.1073/pnas.0707741104. | Shaw P, Gornick M, Lerch J, Addington A, Seal J, Greenstein D, Sharp W, Evans A, Giedd JN, Castellanos FX, Rapoport JL. 2007 Aug. Polymorphisms of the dopamine D4 receptor, clinical outcome and cortical structure in attention-deficit/hyperactivity disorder. *Archives of General Psychiatry.* ; 64(8):921–931. | Shaw P, Lerch J, Greenstein D, et al. 2006. Longitudinal mapping of cortical thickness and clinical outcome in children and adolescents with attention-deficit/hyperactivity disorder. *Arch Gen Psychiatry.* ; 63:540–549. doi: 10.1001/archpsyc.63.5.540. | Sobel JL, Bansal R, Maia TV, et al. 2010. Basal ganglia surface morphology and the effects of stimulant medications in youth with attention deficit hyperactivity disorder. *Am J Psychiatry.* 2010;167:977–986. doi: 10.1176/appi.ajp.2010.09091259. | Srinath S, Girimaji SC, Gururaj G, Seshadri S, Subbakrishna DK, Bhola P, et al. 2005. Epidemiological study of child and adolescent psychiatric disorders in urban and rural areas of Bangalore, India. *Indian J Med Res.* 2005;122:67–79. | Suess PE, Porges SW, Plude DJ. 1994. Cardiac vagal tone and sustained attention in school-age children. *Psychophysiology.* ; 31(1):17–22. | The MTA Cooperative Group. 1999. A 14-month randomized clinical trial of treatment strategies for attention-deficit hyperactivity disorder. *Archives of General Psychiatry.* ; 56:1073–1086. | The MTA Cooperative Group. 1999. Moderators and mediators of treatment response for children with attention-deficit/hyperactivity disorder: The multimodal treatment study of children with attention-deficit/hyperactivity disorder. *Arch Gen Psychiatry.* ; 56:1088–96. | V. R. Hariprasad, R. Arasappa, S. Varambally, S. Srinath, and B. N. Gangadhar, 2013, Feasibility and efficacy of yoga as an add-on intervention in attention deficit-hyperactivity disorder: An exploratory study, *Indian J Psychiatry.* 2013 July; 55(Suppl 3): S379–S384. | Van den Berg AE, Hartig T, Staats H. 2007. Preference for nature in urbanized societies: stress, restoration, and the pursuit of sustainability. *Journal of Social Issues.* ; 63(1):79–96. |