

Attention Deficit Hyperactivity Disorder Treatment Review

Samira Behiyat

Abstract:

Attention Deficit Hyperactivity Disorder (ADHD) is characterised by impulsive, hyperactive and inattentive behaviours among children. For decades researchers have attempted to point out the best treatment for this disorder. However, there is no single best treatment available for ADHD. Pharmacological treatment (stimulants and non-stimulants) remain the primary treatment for ADHD. Behavioural treatments such as clinical behavioural psychotherapy and contingency management as well as combination of these treatments with medication have shed some light in treating ADHD. Cognitive behavioural therapy, dietary modification, nutritional supplements, homeopathy and vision therapy have not shown conclusive results. Neuro-feedback, although promising in treating ADHD, needs further research.

Introduction

Attention deficit hyperactivity disorder (ADHD) is the most common mental health disorder during childhood and affects 3% to 5% of the population. Children with ADHD are excessively active, highly inattentive and impulsive. These symptoms have an adverse effect on the individual's functioning in school, family, and peer domains. If this disorder continues until adolescence and adulthood it can put the individual at risk of impairments in many areas such as school and occupational settings, interpersonal relationships, and can cause criminal behaviour, and alcohol and substance abuse (Pelham and Gnay, 1999).

According to the Diagnostic Statistical Manual of Mental Disorders, fourth edition, Text Revision (*DSM-IV-TR*; American Psychiatric Association, 2000), attention deficit hyperactivity disorder, in short ADHD, has three subtypes. First is the Combined Type in which the individual shows symptoms of both inattention and hyperactivity-impulsivity, second is the Predominantly Inattentive Type which is comprised of symptoms of inattention, and third is the Predominantly Hyperactive-Impulsive Type in which the person shows symptoms of hyperactivity-impulsivity. For a child diagnosed with ADHD these symptoms are expected to be present for at least 6 months before the age of 7, decrease in adolescence, and disappear in late adolescence. It is important to remember that these symptoms must cause impairment in two or more settings such as school and home and affect the person's life in social, academic and occupational domains.

Available treatments for ADHD are very diverse and include psychosocial, pharmacological, and other treatments. These treatments are comprised of traditional, one-to-one psychotherapy, play therapy, restrictive or supplemental diets, allergy treatment, chiropractics, biofeedback, perceptual-motor training, treatment for inner ear problems, pet therapy, cognitive-behavioural therapy, and stimulant and non-stimulant medication. This review looks at behavioural and pharmacological treatment for ADHD, and at the end some of the alternative treatments, as well as combined treatments.

Behavioural Treatment

Smucker and Hedayat in 2001 pointed out that behavioural interventions are based on operant conditioning. The principle of positive rewards promotes appropriate behaviours and reduces undesired behaviours. Although it appears to be a simple principle, it works the best only when school and parents work hand in hand and select a limited number of specific behaviours to work on. Teachers and parents need to identify what triggers and reinforces the problem behaviour and therefore eliminate those environmental conditions from the child's surroundings.

Children with ADHD are impulsive which often leads to rejection by their peers. Psychosocial interventions help these children learn necessary social skills for interacting with peers and adults. This may in return improve the child's lost self-esteem and create a more positive relationship with others (Smucker and Hedayat, 2001). Cognitive-Behavioural Therapy (CBT) is a form of treatment used for treating ADHD. It combines the behavioural treatment with cognitive treatments and focuses on verbal self-instruction,

problem-solving strategies, cognitive modelling, self-monitoring, self-evaluation, and self-reinforcement (Abikoff, 1987). However, Conte (1991) and Gaddes and Edgell, (1994) believe that CBT is not effective in treating ADHD. Limitations of cognitive-behavioural treatment include difficulty in generalising what has been learnt to different settings. If school and parents do not work together there will not be any transfer of learnt skills from school to home, or vice versa. There are chances that problem behaviours will return once the treatment is over (Barabasz, 1987).

Clinical behavioural psychotherapy which gets both parents and teachers involved in a child's treatment, has shown to be significantly effective in children's behavioural improvement. Combination of clinical behavioural psychotherapy with medication is superior to each treatment on its own (Hinshaw, Klein, and Abikoff, 1998; Pelham and Hinshaw, 1992; and Pelham and Murphy, 1986 all in Root II and Rensick, 2003). This treatment approach teaches the parents and teachers basic principles of social learning theories and provides fundamental information about ADHD. Parent training is conducted in groups and homework is assigned to the parents. One major strength of clinical behavioural psychotherapy is its easy implementation in the community (Pelham and Gnay, 1999). Barkley's *defiant children parent training program* (Barkley, 1987) is an example of this treatment.

Contingency management is conducted in institutions where close monitoring is possible. Contingency management programs are run by paraprofessionals, consulting professionals, or specially trained teachers, rather than the child's parent or classroom teachers (Pelham and Gnay, 1999). This treatment is superior to clinical behavioural psychotherapy and is as effective as low dose medication. Pelham's summer treatment program (Pelham, 2000) is an example of direct contingency management (Root II & Rensick, 2003). A great disadvantage of behavioural treatment is that parents' low education level, income, and contact with other adults influence the efficacy of implementation, as well as maintenance of behavioural treatment. These factors most of the time result in high dropout rates (Miller and Prinz, 1990; Wahler, 1980).

In summary, the research shows that cognitive behavioural therapy is not effective in treating ADHD. However, when parents and teachers work together, for example, in clinical psychotherapy, or when children are institutionalised or spend a couple of months in camps, behavioural treatments can be effective.

Pharmacological Treatment

Stimulant medications, such as Ritalin, Concerta, Methylin, Dexedrine, and Adderall are the most prescribed medications in the United States (Fox, Tharp, and Fox, 2005). According to Clarke et al. (2002) these medications have their greatest impact on individuals who suffer from hypoarousal (high theta and low beta and delta activity) compared to individuals who have maturational-lag, which is increased slow wave activity (e.g., delta and theta) and deficiencies in fast wave activity (e.g., beta). Non-stimulant medications for treating ADHD are tricyclic antidepressants such as Desipramine and reuptake inhibitors (Bupropion and Venlafaxine). Barzman, Fieler, and Sallee (2004) reported Atomoxetine, a selective norepinephrine reuptake inhibitor as a very effective non-stimulant in reducing symptoms of ADHD.

Although medications reduce children's tendencies for hyperactivity, inattention, impulsivity and poor self-control, physical and verbal aggression, they fail to enhance a child's antisocial behaviour, reading skills, academic achievement, and family and social maladjustment (Swanson et al., 1993; Goldman, Genel, Bezman, and Slanetz, 1988; Adesman, and Morgan, 1999; Bennett, Brown, Craver, and Anderson, 1999). Stimulant medications have many side effects like insomnia, decreased appetite, stomach pain, headache, emergence or worsening of tics, decreased growth velocity, tachycardia, blood pressure elevation, rebound or deterioration of ADHD behaviours when medication wears off, irritability, social withdrawal and flattened affect (Smucker and Hedayat, 2001). Pemoline (Cylert), a class of stimulants, is reported to increase risk of liver damage and hepatic failure (Smucker and Hedayat, 2001). Psychiatrists should be careful when prescribing stimulants to patients because of risk of abuse. Because of abuse physicians need to screen patients with impulsivity, antisocial tendencies and also those who are at risk for accidents, traffic incidents, and arrests (Smucker and Hedayat, 2001). Another factor that impacts the effectiveness of medication is the compliance issue among families, especially those with low socioeconomic status (Barkley, 1990). Barkley (1990, 1998) reported that a child's symptoms usually return to the original level if the medication is stopped.

In conclusion, despite the adverse side effects, high cost, and other complications caused by medications, they remain the first line of treatment for ADHD.

Other Treatments

Children with ADHD have been treated by dietary modification, nutritional supplements, homeopathy, and vision therapy as well. However, based on research evidences, the effectiveness of these treatment methods are not conclusive, therefore they cannot be considered as alternatives to drugs. A common myth among lay people is that reducing or eliminating sugar from ADHD children's diet would reduce the symptoms; however based on studies done by many researchers (Dulcan, 1997; Wolraich et al, 1994; Krummel, Seligson, and Guthrie, 1996) there is no relationship between sugar and a child's hyperactivity or aggression.

According to Barbaresi (1996) schools are legally responsible to identify students with special education needs, and schools have to make sure that these services are provided for the students. Teachers can help children with ADHD by teaching them how to follow directions, use time efficiently, check their work, take notes, and study effectively. Evans, Serpell, Schultz, and Pastor (2007) studied 79 adolescents with ADHD and compared the effect of school intervention in secondary school with community care. Results showed long-term benefits for the treatment group compared to participants in a community care control group.

According Fox, Tharp, and Fox (2005) neuro-feedback is an alternative to medication for treating ADHD. Neuro-feedback improves attention, reduces impulsivity, controls hyperactive behaviours, and produces long-term changes by modifying patients' brainwave activity. In 1995, Rossieter and LaVaque compared the effect of neuro-feedback and stimulant medication. They studied 46 patients and concluded that there is no significant difference between the effectiveness of the two treatment methods. In another study Linden et al. (1996) compared neuro-feedback with control groups and found that symptoms of ADHD were reduced by using neuro-feedback. Fuchs et al. (2003) compared neuro-feedback with Ritalin and found that both groups had improvements. These studies are promising as an alternative for medication, and according to Monastra et al. (2002) neuro-feedback is the only treatment that can improve the ADHD symptoms in the absence of medication. However, one should be cautious in interpreting and implementing neuro-feedback as an alternative. Limited empirical studies and small sample size makes these findings inconclusive. Other limitations of neuro-feedback are the long duration of treatment (up to 60 sessions or 6 months) and its high cost (Fox, Tharp, and Fox, 2005).

Combined Treatment

According to Root II and Resnick (2003) behavioural treatment alone is preferred by the parents. It has been shown to be effective for children with mild to moderate ADHD, preschoolers, and children who have social skills deficit. However, the combination of behavioural treatment and medication is advisable for children with severe symptoms of ADHD and those who have aggression problems. In situations where the child's behaviour is out of hand, a rapid response is needed, and the child has mental retardation or central nervous system problems such as epilepsy or migraines, combined treatment is favourable.

The available literature suggests a wide range of advantages for combined treatment over single treatment. First, having combined treatment compared to medication only results in administration of lower doses of medication; therefore children suffer from fewer side effects caused by medication (Pelham, 2000; Whalen, 2001). Second, combined treatments have complementary advantages. Parental trainings that are provided in combined treatments enable the parents to deal with the child's problematic behaviour during the day when the effect of medication is fading. At the same time medications help to reduce severe problematic behaviour when the child is being treated through behaviour interventions (Hinshaw, Heller, and McHale, 1992). Third, Long-term effect of treatment is one of the many areas that concern the practitioners and researchers. Combined treatment is believed to have better long-term effects. ADHD children lack cognitive and behavioural skills they need in academic and social domains. These skills are necessary for long-term effectiveness which medication alone cannot provide. Therefore, adding behavioural treatment to medication provides the opportunity for the child to learn skills he or she needs to maintain the positive outcome in the long run. At the same time in order to learn these skills the child needs to be stabilised by taking medication.

Studies by Carlson et al. (1992), and Pelham et al. (1986) showed that a combination of Methylphenidate and behavioural treatment showed greater outcomes compared to either medication or behavioural intervention alone (also in 2005). Pelham et al. compared the effects of Methylphenidate (MPH) in

combination with behavioural modification and medication and behaviour treatments alone. The subjects were 27 children with ADHD between 6 to 12 years old. The results showed that combined treatment was superior to either treatment alone.

Conclusion

Little is known about the causes and treatment of ADHD. Today the primary treatment is believed to be medication in the form of stimulants or non-stimulants. However many researchers have been trying to find other ways than medication to help these children. Behavioural management, education interventions, and family interventions are all attempts to help these children live a normal life in society by improving their functioning in different domains. The effectiveness of each of these treatments and interventions are still being investigated. A treatment that combines pharmacological and psychological treatments appears to be more effective than relying solely on medication or behavioural management.

In deciding which type of treatment is more suitable for an individual practitioners must consider severity of ADHD symptoms, presence or absence of normal hearing and vision capacities, comorbidity with any other disorder, level of school performance, and a child's developmental progression (Smucker and Hedayat, 2001).

One important factor that especially influences the treatment of ADHD is the issue of comorbidity. ADHD is commonly seen among individuals with mental retardation, fragile X syndrome, phenylketonuria or degenerative neurological disorder, dysmorphic features, and abnormalities of growth. Development or neurological function may reflect a genetic disorder (e.g., fragile X syndrome), a prenatal insult (e.g., alcohol abuse by the mother), or a chronic medical condition (Accardo, 1999; Dulcan, 1997; Smucker and Hedayat, 2001). Many ADHD children are reported to have learning disabilities (Dulcan, 1997, Goldman, Genel, Bezman, and Slanetz, 1998). All these disorders affect how ADHD is treated. For example, there is a possibility that medications these individual take may counteract ADHD medication which can make the treatment complicated.

In conclusion, a comprehensive treatment plan that addresses the child's inattention, hyperactivity, and impulsivity symptoms is essential. In addition to a child's academic performance, social interactions and family functioning must be dealt with as well. Therefore, a multimodal treatment for ADHD is necessary.

Works Cited:

- Abikoff, H.
1991 Cognitive training in ADHD children: less to it than meets the eye. *Journal of Learning Disabilities*, 24, 205-209.
- Accardo, P.
1999 A rational approach to the medical assessment of the child with attention-deficit/hyperactivity disorder. *Paediatric clinics of North America*, 46, 845-856.
- Adesman, A. R., and Morgan, A. M.
1999 Management of stimulant medications in children with attention-deficit/hyperactivity disorder. *Paediatric clinics of North America*, 46, 945-963.
- American Psychiatric Association.
2000 *Diagnostic and statistical manual of mental disorders* (4th ed., text revision). Washington, DC: Author.
- Barabasz, M.
1987 Tricotillomania: A new treatment. *International Journal of Clinical and Experimental Hypnosis*, 35, 146-154.
- Barbaresi, W. J.
1996 Primary-care approach to the diagnosis and management of attention-deficit hyperactivity disorder. *Mayo Clinic Proceedings*, 71, 463-471.
- Barkley, R. A.
1987 *Defiant children: A clinician's manual for parent training*. New York: Guilford Press. In: Root II, R. W. & Rensick, J. R. (2003). An update on diagnosis and treatment of Attention-Deficit/ Hyperactivity Disorder in children. *Professional Psychology Research and Practice*, 34, 30-41.
- Barkley, R. A.
1990 *Attention deficit hyperactivity disorder: A handbook for diagnosis and treatment*. New York: Guildford. In: Fox, D. J., Tharp, D. F., & Fox, L. C. (2005). Neurofeedback: An alternative and efficacious treatment for attention deficit hyperactivity disorder. *Applied Psychophysiology and Biofeedback*, 30, 365-373.

- Barkley, R. A.
1998 *Attention-deficit hyperactivity disorder: A handbook of diagnosis and treatment* (2nd ed.). New York: Guilford. In: Fox, D. J., Tharp, D. F., & Fox, L. C. (2005). Neurofeedback: An alternative and efficacious treatment for attention deficit hyperactivity disorder. *Applied Psychophysiology and Biofeedback*, 30, 365-373.
- Barzman, D. H., Fieler, L., and Sallee, F. R.
2004 Attention Deficit Hyperactivity Disorder diagnosis and treatment separating myth from Substances. *The Journal of Legal Medicine*, 25, 23-38.
- Bennett, F. C., Brown, R. T., Craver, J., and Anderson, D.
1999 Stimulant medication for the child with attention-deficit/hyperactivity disorder. *Paediatric clinics of North America*, 46, 929-944.
- Carlson, C. L., Pelham, W. E., Milich, R., et al.
1992 Single and combined effects of methylphenidate and behaviour therapy on the classroom performance of children with ADHD. *Journal of Abnormal Child Psychology*, 20, 213-232.
- Clarke, A. R., Barry, R. J., McCarthy, R., Selikowitz, M., and Brown, C. R.
2002 EEG differences in two subtypes of attention-deficit/hyperactivity disorder. *Psychophysiology*, 38, 212-221.
- Conte, R.
1991 Attention disorders. In B. Wong (Ed.), *Learning about learning disabilities*. New York: Academic Press. In: Fox, D. J., Tharp, D. F., and Fox, L. C. (2005). Neurofeedback: An alternative and efficacious treatment for attention deficit hyperactivity disorder. *Applied Psychophysiology and Biofeedback*, 30, 365-373.
- Dulcan M.
1997 Practice parameters for the assessment and treatment of children, adolescents, and adults with attention-deficit/hyperactivity disorder. *American Academy of Child and Adolescent Psychiatry*, 36, 85-121.
- Evans, S. W., Serpell, Z. N., Schultz, B. K., and Pastor, D. A.
2007 Cumulative benefits of secondary school-based treatment of students with attention deficit hyperactivity disorder. *School Psychology Review*, 36, 256-273.
- Fox, D. J., Tharp, D. F., and Fox, L. C.
2005 Neurofeedback: An alternative and efficacious treatment for attention deficit hyperactivity disorder. *Applied Psychophysiology and Biofeedback*, 30, 365-373.
- Fuchs, D., Mock, D., Morgan, P. L., and Young, C. L.
2003 Responsiveness-to-intervention: Definitions, evidence, and implications for the learning disabilities construct. *Learning Disabilities Research & Practice*, 18, 157-172.
- Gaddes, W. H., and Edgell, D.
1994 *Learning disabilities and brain function*. New York: Springer-Verlag. In: Fox, D. J., Tharp, D. F., & Fox, L. C. (2005). Neurofeedback: An alternative and efficacious treatment for attention deficit hyperactivity disorder. *Applied Psychophysiology and Biofeedback*, 30, 365-373.
- Goldman, L. S., Genel, M., Bezman, R. J., Slanetz, P. J.
1998 Diagnosis and treatment of attention-deficit/hyperactivity disorder in children and adolescents. *The Journal of American Medical Association*, 279, 1100-1107.
- Hinshaw, S. P., Heller, T., and McHale, J. P.
1992 Covert antisocial behavior in boys with attention deficit hyperactivity disorder: external validation and effects of methylphenidate. *Journal of Consultation Clinical Psychology*, 60, 274-281.
- Hinshaw, S. P., Klein, R. G., and Abikoff, H.
1998 Childhood attention deficit hyperactivity disorder: Nonpharmacologic and combination treatments. In: Root II, R. W. & Rensick, J. R. (2003). An update on diagnosis and treatment of Attention-Deficit/ Hyperactivity Disorder in children. *Professional Psychology Research and Practice*, 34, 3-41.
- Krummel, D. A., Seligson, F. H., and Guthrie, H. A.
1996 Hyperactivity: is candy causal? Critical Review in Food Science and Nutrition, 36, 31-47.
- Miller, G. E., & Prinz, R. J.
1990 Enhancement of social learning family interventions for childhood conduct disorder. *Psychological Bulletin*, 108, 291-307.
- Monastra, V. J., Monastra, D. M., and George, S.
2002 The effects of stimulant therapy, EEG biofeedback, and parenting style on the primary symptoms of attention deficit/hyperactivity disorder. *Applied Psychophysiology and Biofeedback*, 27, 231-249.
- Pelham, W. E., and Murphy, H. A.
1986 Attention deficit and conduct disorders In: Root II, R. W. & Rensick, J. R. (2003). An update on diagnosis and treatment of Attention-Deficit/ Hyperactivity Disorder in children. *Professional Psychology Research and Practice*, 34, 3-41.

- Pelham, W. E., and Hinshaw, S. P.
1992 Behavioural intervention for ADHD. In: Root II, R. W. & Rensick, J. R. (2003). An update on diagnosis and treatment of Attention-Deficit/ Hyperactivity Disorder in children. *Professional Psychology Research and Practice*, 34, 3-41.
- Pelham, W. E., and Gnay, E. M.
1999 Psychosocial and combined treatment for ADHD. *Mental Retardation and Developmental Disabilities Research Review*, 5, 225-236.
- Pelham, W. E.
2000 Behavioural versus behavioural and pharmacological treatment in ADHD children attending a summer treatment program. *Journal of Abnormal Child Psychology*, 28, 507-525.
- Pelham, W. E., Burrows-MacLean, L., Gnagy, E. M., Fabiano, G. A., Coles, E. K., Tresco, K. E., Chacko, A., Wymbs, B. T., Wienke, A. L., Walker, K. S., and Hoffman, M. T.
2005 Transdermal Methylphenidate, Behavioral, and Combined Treatment for Children With ADHD. *Experimental and Clinical Psychopharmacology*, 13, 111-126.
- Root II, R. W., and Rensick, J. R.
2003 An update on diagnosis and treatment of Attention-Deficit/ Hyperactivity Disorder in children. *Professional Psychology Research and Practice*, 34, 3-41.
- Rossieter, T. R., and LaVaque, T. J.
1995 A comparison of EEG biofeedback and psychostimulants in treating attention deficit/hyperactivity disorders. *Journal of Neurotherapy*, 1, 48-59.
- Smucker, W. D., and Hedayat, M.
2001 Evaluation and treatment of ADHD. *American Family Physician*, 64, 817-829.
- Swanson, J., McBurnett, T., Wigal, T., Pfiffner, L., Lerner, M., Williams, L., et al.
1993 Effect of stimulant medication on children with attention deficit disorder: A review of reviews. *Exceptional Children*, 60, 154-162.
- Wahler, R. G.
1980 The insular mother: her problems in parent-child treatment. *Journal of Applied Behavioural Analysis*, 13, 207-219.
- Whalen, C. K.
2001 ADHD treatment in the 21st century: Pushing the envelope. *Journal of Clinical Child Psychology*, 30, 136-140.
- Wolraich, M. L., Lindgren, S. D., Stumbo, P. J., Stegink, L. D., Appelbaum, M. I., Kiritsy, M. C.
1994 Effects of diets high in sucrose or aspartame on the behaviour and cognitive performance of children. *The New England journal of medicine*, 330, 301-307.

About the author:

Samira Behiyat is currently doing her Master's in education at Asia-Pacific International University.