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Case Report

Role of *Ayurveda* in Management of Attention Deficit Hyperactivity Disorder: A Case Report

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Abstract: ADHD is a neurodevelopmental disorder manifested by a constant pattern of inattention and/ or hyperactivity-impulsivity which hinders with functioning and development of brain. Inattention refers to difficulty in focusing due to lack of grasping/ retaining things which are instructed to do. Hyperactivity refers to the constant movements when the situation is not appropriate. Impulsivity means one may act without thinking or having difficulty with self-control, it may also involve inability to delay gratification. Systematic reviews illustrate that globally, community prevalence rate is between 2% and 7% with an average of around 5%. Our aim is to prove the efficacy of Ayurvedic interventions in the management of ADHD. Objectives are to reduce the symptoms of hyperactivity, inattention, and impulsivity significantly according to DSM-V criteria. A male patient aged 7 years was brought by his parents to the Paediatric OPD with complaints of lack of concentration since duration of 4 years, easy irritability, shouting, head banging and inability to speak sentences properly, then by interrogation and physical examination the patient was diagnosed to be suffering from attention deficit hyperactivity disorder with reference to DSM-V criteria. Then he was given Ayurvedic interventions while receiving three sittings of treatment. Results & discussion include significant reduction of symptoms of inattention, hyperactivity and impulsivity under DSM-5 criteria was observed in the patient after three sittings of treatment because of the mode of action of the drugs in the respective formulations and the strengthening therapy of the procedures done during the sittings. Therefore, we conclude this case study establishes the fact that ADHD can be managed by Ayurvedic interventions so that the child can be able to perform his daily activities. This multimodal approach along with occupational therapy works as wonder in the management of attention deficit hyperactivity disorder.

Keywords: ADHD, Hyperactivity, Inattention, Impulsivity, DSM- V Criteria, Unmada

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1. INTRODUCTION

ADHD is a neurodevelopmental disorder manifested by a constant pattern of inattention and/ or hyperactivity-impulsivity which hinders with functioning and development of brain. Inattention refers to difficulty in focusing due to lack of grasping/ retaining things which are instructed to do. Hyperactivity refers to the constant movements when the situation is not appropriate. Impulsivity means one may act without thinking or having difficulty with self-control, it may also involve inability to delay gratification.[1] Systematic reviews illustrate that globally, community prevalence rate is between 2% and 7% with an average of around 5% among youngsters. The summarized prevalence of ADHD is 9.40% (95% CI 6.50%–13.30%; I^2 = 96.07% P < 0.001) among male children and 5.20% (95% CI 3.40%–7.70%; I^2 = 94.17% P < 0.001) among female children with a range of 7.6%–15% in 8–15 years of children.[2] Boys are more vulnerable to suffer from attention deficit hyperactivity disorder than girls as girls manage to be quite sensible and confiding about their nature.[3] Multiple factors are said to be responsible for ADHD. Strong genetic component is important factor results in the disease. Mother of the child with ADHD may have the history of birth complication such prolonged labour, toxaemia, and complicated delivery.[4] Drug abuse and addiction of mother are also being recognised as risk factors.[5] Various food colouring agents and preservatives have been related with hyperactivity in previously hyperactive children. subsequent onset of the symptoms of impulsivity and inattention can be due to abnormal brain structure and traumatic brain injury.[6] DSM V criteria are the criteria of diagnosis for ADHD. According to this, the suffering child should have more than 6 symptoms of a particular type.[7] ADHD has three subtypes; the first being predominantly Inattentive type, common in females which often includes cognitive impairment. The other 2 types are commonly diagnosed in males those are hyperactive impulsive type and combined type.[8] The symptoms may vary according to age such as, motor restlessness, aggressive and disrupting behaviour are frequently seen in preschool children while inattentive, distractible, and disorganised symptoms are more typical in older adolescents.[9] Presynaptic dopaminergic agonists commonly called psycho stimulants medication are the choice of drug for treating ADHD. Increased risk of adverse cardiovascular events which includes sudden cardiac death, myocardial infraction and stroke in young adults rarely in children may be associated with Stimulant drugs which are used to treat the disease.[10] Ayurveda explains almost all the psychiatric and behavioural disorders under the headings of Unmada and Apasmara, where Unmada is a disease featured by unstable intellect, mind, knowledge, memory, consciousness, inclination, poor conducts of behaviour and bad manners.[11] It is an obsession occurring in cowardly and weak minded individuals resulting from imbalance of Tridosha (three body humours) residing in mind caused.[12] It is also mentioned that inappropriate physical activities by a very weak person and psychological disturbances caused due to over consciousness about illness, emotional instability like excessive anger, grief, irritability, fear etc. results into decline of balanced psychological functions in a person. Satwa Guna (quality of mind which is a symbol of positivity) tend to decrease in the person due to the above factors resulting in Tridosha (Three bodily humours) getting localised in Hridaya (Heart/Mental faculty), causing diminished functioning mental faculty and finally causing Unmada.[13] Due to loss of intellect, knowledge and memory, the person does not experience happiness and sorrow.[14] Unmada is of five types[15] its prognosis is said to be Sadhya (Curable) by treating it with internal medications along with various therapeutic procedures. Ayurveda suggests the treatment protocol as, Snehan (Oleation), Swedana (Sudation), Shodhana (Purificatory) procedures like Vamana (Emesis), Virechan (Purgation), Basti (Medicated enema), Nasya), Dhumapana (Medicated smoke), Anjana (Collyrium application), Abhyanga (Massage), Lepa (External application), Parisheka (Oil bath) also Shaman Chikitsa (Internal medication).[16] The present case was an attempt to study the role of Ayurveda line of management in a case of ADHD which was diagnosed as Vata- Pittaj Unmada in Ayurveda.

2. CASE PRESENTATION

A male patient of 7 years was brought by his parents with the chief complaints of lack of concentration since the duration of 4 years, easy irritability, shouting, head banging and inability to speak sentences properly. The associated complaints were less eye contact, feeling of warmth in palms and soles occasionally, anger, lack of appetite, sleep disturbances. The patient was apparently healthy before 4 years. Gradually, he developed an inattentive and hyperactive behaviour. He was also unable to form bi-syllables and sentences properly. Developmental history includes gross motor response which was achieved on time, fine motor response which was achieved lately, personal & social behaviour involved less eye contact, no interactive play, only with adults, was unable to talk in sentences, Immunization history included all vaccines which were given according to schedule till the age in private sector. Family history is not relevant in this case. Personal history includes poor appetite, bowel habits being once or twice a day, micturition being 7-8 times a day along with disturbed sleep. The patient likes more of outside packaged food stuff, biscuits & chocolates and dislikes milk and dairy products.

2.1. Consent

Patient's written consent was taken before physical examination and therapies.

Table 1: Parameters of general examination

Parameters	Findings
Built	Lean
Appearance	Hyperactive
Eyes	Pallor+, no icterus
Tongue	Coated
Pulse rate	94/min.
Respiration rate	24/min.
Blood pressure	80/60mmHg
Temperature	Afebrile

Appetite	Poor
Sleep	Disturbed

Table No. 1 illustrates parameters in general examination including vitals and personal history. On CNS examination, we observed that the patient was conscious but not oriented about time, place, and age. On CVS examination, we found that S1, S2 are clear along with no adventitious sounds. On respiratory system examination, we found that air entry was bilaterally symmetrical and the breathing sounds were normal i.e., bronchovesicular sounds. Per-abdominal examination showed no organomegaly or distension. The anthropometric measurements were as follows; weight=21.5kg, height= 127cm, head circumference=54cm, chest circumference=60cm and mid-arm circumference=17cm.

Table 2: Higher mental functions

Sl.No.	HMF tested	Remarks
1.	Consciousness & orientation	Alert, oriented to person and place only
2.	Attention	Inattentive
3.	Appearance	Hyperactive, well-dressed
4.	Facial expression	Normal, less eye contact
5.	Behaviour	Irritable after half an hr of reading, fidgets/taps often
6.	Identification	Colour identification
7.	Speech	Bi-syllables

Table No. 2 illustrates higher mental functions included in CNS examination including consciousness, appearance, attention, behaviour, and speech.

Table 3: Samprapti ghatak(Pathogenesis)

Dosha	*Pitta, Vata*
Dushya	*Rasadi saptadhatus*
Srotas	*Manovaha*
Sadhyasadhyata	*Sadhya*
Agni	*Manda*
Ama	*Sama*
Utbhava sthana	*Manas,Mastishka*
Vyakta sthana	*Sarva sharira*

Table No. 3 illustrates the parameters playing a vital role in the pathogenesis of the concerned case of Attention Deficit Hyperactivity Disorder

- ***Clinical features and related Dosha***

✓ ***Pitta*:** Excessive sweating, feeling of warmth in palms and soles, intolerance to heat, anger, lack of appetite and easily irritable.[17]
✓ ***Vata*:** Hyperactivity, unable to talk properly, lean and sleep disturbances.[18] Hence, it can be corelated with Unmada. The treatment protocol includes ama pachan, agni deepan, snehan and swedan, vata anuloma as well as brimhana.[19]

Table 4: Prescribed medications/ Formulations in 1st sitting from DOA 26/07/21 to DOD 04/08/21

Sl. No	Formulations	Dose	Anupana	Duration
1.	*Amapachaka vati*	1/2 of 500mg BD	Lukewarm water	15days
2.	*Agnitundi vati*	½ of 250mg BD	Lukewarm water	15days
3.	*Abhayaarishta*	1 tsf BD before food	Equal amount of water	1month
4.	*Kalyanak Ghrita*	1tsf at bedtime	Milk	1month

Table No. 4 illustrates the prescribed medications in the 1st sitting of treatment according to doshik predominance and manifested symptoms of the patient so that the symptoms mentioned in the DSM-V criteria would be reduced due to efficacy of the drugs mentioned in the above formulations.

Table 5: Prescribed therapies in 1st sitting from DOA 26/07/21 to DOD 04/08/21

Sl. no.	Therapy/ Procedures	Medicine used
1.	*Sarvanga abhyanga*	*Ksheerabala Taila*
2.	Nadi swedana	
3.	*Matrabasti*	*Bala Taila* (10ml,15ml, 20ml) with a pinch of *Saindhava lavana*
4.	*Shiro pichu*	*Bala taila 101 avarti*

Table No. 5 illustrates the recommended procedures required for improving the macro and micro circulation in the body for starting major procedures included in the murdhni tail, i.e., shiropichu so that hyperactivity, inattention and impulsivity symptoms are reduced.

Table 6: Prescribed medications in 2nd sitting treatment from DOA 28/11/21 to DOD 07/12/21

Sl. No	Formulations	Dose	Anupana	Duration
1	*Kalyanaka Ghrita*	1 tsf OD (morning) X 7 days	Milk	1month
2	*Abhayaarista*	½ tsf HS	equal amount of water	1month
3	*Drakshadi Kashaya*	3tsf BD	Water	1month

Table No. 6 illustrates the prescribed medications in the 2nd sitting of treatment according to doshik predominance and manifested symptoms of the patient so that the symptoms mentioned in the DSM-V criteria would be reduced due to efficacy of the drugs mentioned in the above formulations.

Table 7: Prescribed medications in3rd sitting treatment from DOA 05/05/22 to DOD 17/05/22

Sl. No.	Formulations	Dose	Anupana	Duration
1	*Shishubharan ras*	½ tab BD AF	Water	1month
2	*Bramhi ghrita*	½ tsf BD BF	Milk	1month
3	*Abhaya arista*	2 tsf BD	Equal amount of water	1month
4	*Aswagandha churna*	½ tsf BD	Milk	1month

Table No. 7 illustrates the prescribed medications in the 3rd sitting of treatment according to doshik predominance and manifested symptoms of the patient so that the symptoms mentioned in the DSM-V criteria would be reduced due to efficacy of the drugs mentioned in the above formulations. Therapies in both second and third sittings included Sarvanga abhyanga with Ksheerabala tail, Shiropichu and Shiroabhyanga with Brahmi tail.

3. OBSERVATIONS & RESULTS

Symptoms of inattention, hyperactivity, and impulsivity according to DSM- 5 criteria were significantly reduced after medicinal intervention and by panchkarma procedures. Patient's anger, irritability and inattention were reduced. The classical line of management of Unmada suggests carminative and drugs that promote digestion, internal oleation use of medicated ghee, mild body purification by emesis or purgation, decoction enema and oil enema, medicated nasal drops and oral medication to stabilise the mind. Also, the other procedures like Abhyanga, Nadisweda and Murdhinitaila prove to be effective in Unmada. By using the above details as a guide, planning of treatment and selection of drugs were made in the present case based upon the main Dosha involvement.

Table 8: Observations in reduction of symptoms of ADHD

Sl. No.	Symptoms	On admission	On discharge	On 22/11/22
1.	Hyperactivity	++++	++	Reduced
2.	Anger/ Easy irritability	++++	+	+
3.	Lack of appetite	++++	++	----
4.	Less eye contact	++++	+	+
5.	Unable to speak two words at a time and sentences	++++	+	+
6.	Incomplete work	++++	+	+
7.	Social behaviour & personal hygiene	----	----	Improved
8.	Sleep disturbances	++++	Nil	Nil
9.	Stubborness	----	----	+ (since 1month)

The + sign refers to grading of symptoms of DSM-V criteria, ++++ means 4, after treatment, symptoms got reduced to +, i.e., 1, ---- means nil symptoms.

Table No. 8 showing the reduction in the above symptoms of ADHD diagnosed patient during 2 follow-ups like anger/ easy irritability, less eye contact, speech delay, incomplete work, sleep disturbances, stubbornness after three sittings of treatment, both shodhan and shaman, there is marked improvement in appetite as digestive fire is the causative reason of every disease.

Table 9: Observations in reduction of individual symptoms of inattention

Inattention	Initial stage	On discharge	On 22/11/22
Often fails to give close attention to details or carelessness	+++++	++	+
Often has difficulty in sustaining attention in tasks/ activities	++++	++	+
Often does not seem to listen when spoken to directly	+++++	+	+
Often does not follow instructions	++++	++	--
Often has difficulty in organizing tasks.	+++	++	+
Often reluctant to engage in tasks requiring sustained mental effort	+++	++	+
Often loses things necessary for tasks or activities	+++	++	+

Easily distracted by extraneous stimuli	++++	++	+
Forgetfulness in daily activities	++++	+	+

The + sign refers to grading of symptoms of DSM-V criteria, ++++ means 4, after treatment, symptoms got reduced to +, i.e., 1, ---- means nil symptoms.

Table No. 9 illustrates reduction of symptoms of inattention according to DSM- V criteria after three sittings of treatment.

Table10: Observations in reduction of symptoms of hyperactivity

Hyperactivity	Initial stage	On discharge	On 22/11/22
Often fidgets with or taps hands or feet or squirms in seat	+++++	++	+
Often leaves seat in situation when remaining seated is expected	++++	++	+
Often runs about or climbs in situation where it is inappropriate	+++	+	+
Often unable to play or engage in leisure activities quietly	++	+	+
Often talks excessively	++++	+++	+
Often "on the go" acting as if "driven by a motor"	----	----	+

The + sign refers to grading of symptoms of DSM-V criteria, ++++ means 4, after treatment, symptoms got reduced to +, i.e., 1, ---- means nil symptoms.

Table No. 10 illustrates reduction in symptoms of hyperactivity according to DSM-V criteria after three sittings of treatment.

Table 11: Observations in reduction of symptoms of impulsivity

Impulsivity	Initial stage	On discharge	On 22/11/22
Often blurts out an answer before a question is completed	+++	++	+
Often has difficulty waiting for his/her turn	+++	++	+
Often interrupts or intrudes on others	+++	++	+

The + sign refers to grading of symptoms of DSM-V criteria, ++++ means 4, after treatment, symptoms got reduced to +, i.e., 1, ---- means nil symptoms.

Table No. 11 illustrates the reduction of above symptoms of impulsivity according to DSM- V criteria after three sittings of treatment.

4. DISCUSSION

While scrutinizing the etiological factors in the child and from the antenatal history of the mother, the fact was established that Pitta and Vata dosha were vitiated from the level of *Garbhavastha (Rasaja, Satmyaja and Satwaja Bhava)* which caused the present condition of the child.[20] It has been elaborated in *Ayurveda* that during the formation of *Garbha*(foetus) the normalcy of *Shukra*(sperm) and *Shonita*(ovum) along with the *Shadbhav(*six vital factors forming the foetal formation and development) and dietary regimen as well as lifestyle habits of the mother govern the well-being of the child.[21] *Garbhini paricharya*(ante-natal care) should be followed properly to avoid any complications throughout the pregnancy.[22] The mana(mind) of the foetus procures the characteristics of *Triguna* (*Sattwa, Raja, Tamas*) depending on the psychology of the parents.[23] In this instance, the usual functions of Vata were disrupted, resulting in hyperactivity in the kid. The kid was unable to regulate his thoughts and stimuli, making it impossible for him to attend to his parents or engage in balanced activities. Pitta Dosha predominated over Vata Dosha in the infant, as evidenced by signs such as aggressiveness, rage, irritability, distaste of hot objects, hate of wearing clothes, and yearning for cold air and water. The case was classified as Vata- Pittaja Unmada for the reasons stated above. The characteristics resembling to that of *Pitta* are excessive sweating, feeling of warmth in palms and soles, intolerance to heat, anger, lack of appetite and easily irritable and to that of *Vata* are hyperactivity, unable to talk properly, lean and sleep disturbances. Hence, it can be corelated with *Unmada*.[24]The child presented with the complaints of prominently hyperactivity as per DSM V criteria. The child should have six or more symptoms of the type to verify the diagnosis.[25] Classical managements of *Unmada* includes *Snehana* (Both internal & external) and *Pitta-shamak aushadhi* balanced the vitiated dosha. *Medhya rasayan* acted at the level of *manas* and *mastishka* correcting *vibhrama* of *manasika bhava*. *Agni Dipana, Brimhana* and *Vata anulomana* therapies supported the overall effect.[26] Utsadana with Triphala Churna and Dashmoola Taila: - Utsadana is administered in an unctuous form as the powder is made into a paste added with lipids. It is mentioned that Utsadana provides glow, beauty, and complexion. It is also a kind of Effleurage where stretching is not intended. Light or deep stroke may be used as per the requirement of the patients. Effleurage increases serotonin secretion responsible for combat depression, anxiety, irritability, etc. melatonin is secreted by the pineal gland of the brain and is responsible for sleep. Thus, it induces the Tranquilizer effect (Nidrakara). Moreover, Effleurage may reduce somatic dysfunctions. As a result, referred pain due to somatic dysfunction subsided spontaneously.[27] Sarvanga Abhyanga with Dhanwantara Taila followed by Dashmoola Kwatha Nadi Swedana: - Abhyanga is a form of Ayurvedic therapy which involves massaging the whole body with lukewarm medicated oils. Oleating the body helps pacify Vata.[28] It is responsible for hyperactive behavior in ADHD patients. Massage therapy has also been shown to increase serotonin levels which might help to modulate elevated dopamine levels in children with ADHD.[29] Amplified vagal tones, thereby amplified parasympathetic activity, have been eminent throughout a massage therapy, and this intensification is frequently linked with improved attentiveness and an extra relaxed state.[30] Acharya Charaka, defines Rasayana as the source of achieving the excellent quality of Rasadidhatus (body

tissues) which increases life span, improves Medha (intelligence), stabilises youthfulness, cures disease, improves complexion, lustre, voice and makes body strong and healthy.[31] So Sarsawataarishta with gold is selected as a choice of drug as best rejuvenator as it promotes memory and intelligence, improves speech, promotes health. It provides nourishment to body tissue and acts on mind. Suvarana (Gold) is also indicated in Unmada and there is significant reduction in the symptoms of ADHD.

5. CONCLUSION

In the view of Ayurveda, ADHD can be correlated with Unmada due to psycho-somatic manifestation. The evaluation of etiological factors showed relevance with prenatal psychological and physical status of the mother. By using the above details as a guide, planning of treatment and selection of drugs were made in the present case based upon the main Dosha involvement. To control the vitiated Vata and Pitta Dosha, both internal and external oleation therapy was given with the administration of ghee processed with cognitive enhancers and oil processed with drugs having soothing and cooling properties respectively. Lipophilic drugs are said to have the properties to cross blood brain barrier. The child showed improvement in social behaviour and there was a marked reduction in the ongoing pattern of inattention, hyperactivity and impulsivity after the treatment which included oleation, head massage and medicated oil enema. The child was observed to be normal after the follow-up period and was cooperative during therapies. Thus, Ayurveda can prove a vital effect in management of ADHD.

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7. AUTHORS CONTRIBUTION STATEMENT

Dr. Manisha Panda has prepared the original draft of the manuscript after collecting proper data of patient's history and sitting wise treatment, Dr. Jyothy K.B. and Dr. Srihari S have given their important contributions by planning the treatment of the diagnosed patient, discussed the methodology and analysed the manuscript's data in a proper way. The three sittings of the treatment were planned by the above three authors in a unique way so that patient would do his daily activities in day-to-day life. Dr. Renu Rathi has improved the styling of tables to make the manuscript catchy and added valuable inputs. All authors read and approved the final version of the manuscript.

8. CONFLICT OF INTEREST

Conflict of interest declared none.

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