



A Comparative Clinical Study Between Kushmandak Rasayanam and Brahmi Ghrita in Vataj Unmad w.s.r. to Adhd [Attention Deficit /Hyperactivity Disorder]

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Abstract

Psychosomatic disorders in children have risen in the pediatric age group, with attention deficit/hyperactivity disorder (ADHD) being one of the prominent conditions. It can be correlated with Vataj Unmad (i.e. Mansik Vikara).

Methods: A prospective, interventional, randomised, double-arm open clinical study was conducted on 40 children (4–12 years), divided into two groups. Group I received Kushmandak Rasayanam and Group II received Brahmi Ghrita for 60 days with a 30-day follow-up. Assessment was done using subjective parameters for ADHD (DSM-V Criteria) and Vataj Unmad and Objective Criteria: Conners' Parent Rating Scale – T-score.

Results: Both treatment modalities were effective in reducing symptom severity. Kushmandak Rasayanam demonstrated comparatively better results in cognitive problems in children with Vataj Unmad or ADHD. **Discussion:** Both treatments act as neuroprotective and regulate neurotransmitters, but Kushmandak Rasayanam supports physiological functions in children with ADHD or Vataj Unmad, offering a palatable and well-tolerated therapeutic option.

Conclusion: Kushmandak Rasayanam and Brahmi Ghrita were compared, and their use is a safe and effective Ayurvedic medicine for the condition of Vataj Unmad or ADHD (Attention deficit/hyperactivity disorder).

Keywords: Vataj Unmad, ADHD (Attention deficit/hyperactivity disorder), Manas Vikar, Kushmandak Rasayanam, Brahmi Ghrita, Neurobehavioural disorder, Dopamine.

Introduction

The connection between the mind and body holds significant importance in Ayurveda. The incidence of psychosomatic disorders in children has risen in pediatric clinics, with attention deficit/hyperactivity disorder (ADHD) being one of the prominent conditions. ADHD is the commonest neurobehavioral disorder of childhood characterised by inattention, hyperactivity and impulsivity; it is 3 times more common in boys¹.

All psychological disorders and behavioural issues are classified under the Manas Vikar in Ayurveda such as Unmad, Apasmar, Mada and Murcha. There is no direct reference for ADHD (Attention deficit/hyperactivity disorder), but looking into the clinical features and patterns, it can be correlated with Vataj Unmad (i.e., Manasik Vikara). According to Acharya Charaka, in individuals with minority personality traits (Alp-Sattva), the Vata Dosh becomes aggravated, affecting the heart, which is the seat of the intellect (Mastishka), and is located in the Manovaha Strotas (the channel of the mind). This condition results in impatience of the mind (Mana) and leads to the manifestation of Unmad Roga². The symptoms of ADHD are quite similar to those of Vataj Unmad, including the following: - Asthanhas (Laughs without reason), Asthanasmitnityagitvag (shouts and sings and dances without reason at inappropriate times), Angvikshepad (Fidget with hand or feet), Rodan (cry without any reason)³.

Acharya Charak has described Brahmi Ghrita⁴ and Kushmandak Rasayanam⁵ described in Sahstrayogam for the management of Unmad.

The primary ingredient of Kushmandak Rasayanam is Kushmanda, known for its properties as Medhya, Anuloman, Nidrajanan and Balya⁶. It also functions as a neuroprotective agent. Additional elements consist of Pippali, Shunthi, Jeerak, Dhanyak, and Marich, each of which exhibits Ushna Virya. These components function to equilibrate Vata Dosh and improve metabolic processes. In individuals with ADHD, there is a disruption of the frontal subcortical circuits, leading to deficiencies within the neural network that primarily affect neurotransmission, particularly involving dopamine and noradrenaline. Kushmanda influences neurotransmitter systems such as GABA, serotonin, and dopamine⁷.

Aim & Objectives: The study aimed to compare the efficacy of Kushmandak Rasayanam and Brahmi Ghrita in Vataj Unmad w.s.r. to ADHD [Attention deficit /hyperactivity disorder] & to study the effect of Kushmandak Rasayanam and Brahmi Ghrita in the management of Vataj Unmad w.s.r. to ADHD.

Materials & Methods: An open-label, randomised, double-arm study was conducted on 40 children aged 4-12 years at the Department of Kaumarbhritya, Shri Khudada Dungaji Government Ayurvedic Hospital, Raipur (C.G.).

Inclusion Criteria: Children between 4-12 years of age, patients having features of Vataj Unmad as per Ayurvedic & ADHD as per modern literature, consent obtained from respective parents /gaurdians.

Exclusion Criteria: Patient of age below 4 year and above 12 year of either gender, children with chronic infection, children with seizure.

Withdrawal Criteria: Those who are not regular at follow up & Uncooperative patient.

Assessment Criteria(Subjective): DSM-V8 criteria for diagnosis of children with ADHD. Inattention, hyperactivity and impulsivity were measured. The study assessed Asthanhas (Laughs without reason), Asthanasmitnityagitvag (shouts and sing and dance without at inappropriate times), Angvikshepad (Fidget with hand or feet) and Rodan (cry without any reason)⁹, which are considered important components of Vataj Unmad in Ayurveda.

Assessment Criteria(Objective): Conners' Parent Rating Scale – T-score for ADHD¹⁰.

Table No.01- Material of Kushmandak Rasayanam

Sr.No.	DRUG	BOTANICAL NAME	PART USE	RATION	QUANTITY
1.	Kushmanda (pakkva)	Benincasa hispida (Thunb) Cogn	Phala	100	10 kg
2.	Pippali	Piper longum Linn	Phala,kand	1	100gm
3.	Shunthi	Zingiber officinale Rosc.	Kand	1	100gm
4.	Jeerak	Cuminum cyminum	Beeja	1	100gm
5.	Darusita	Cinnamomnm zalyanicum	Twaka,Patra	1	100gm
6.	Ela	Elettaria cardamomum melton	Beeja	1	100gm
7.	Dhanyak	Coriandrum sativam Linn.	Panchang	1	100gm
8.	Marich	Piper nigram linn.	Phala	1	100gm
9.	Ghrita			12	1.2kg
10.	Khandsita			100	10kg

Collection Of Drugs: These drugs were purchased from Ayurvedic Raw Drug Pharmacy in the local market in Raipur (C.G.).

Preparation Of Kushmandak Rasayanam:

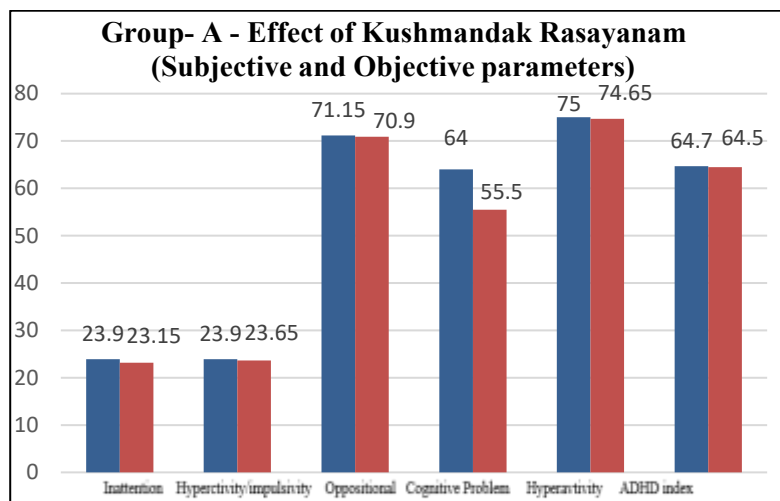
Take all ingredients of Prakshepya dravyas of pharmacopoeia quality and Powder all ingredients and pass through sieve number 85. Take fresh mature fruit of Kushmanda is cut into pieces and the skin and seeds are removed. Add double the quantity of water. Heat till Kushmanda pieces become soft to make pishti, maintaining a temperature between 90° to 100°, Strain the liquid through a muslin cloth. Keep the strained liquid separately and crush the boiled pieces and make a fine paste, fry it in Ghrita, with constant stirring, maintaining a temperature between 80° to 90° till the mixture turns brown. Add Khanda to the strained liquid and heat to make two thread sugar syrup and add the fried paste of Kushmanda to the syrup, heat with constant stirring, maintaining a temperature between 90° to 100° till formation of soft bolus, which does not disperse in water stop heating and allow to cool. Add fine powder of the ingredient and prepare a homogeneous blend, allow cooling it to room temperature and store in a glass jar.

Table No.02- Material of Brahmi Ghrita

Sr.No.	DRUG	BOTANICAL NAME	PART USE	RATION
1.	Brahmi	Bacopa monnieri (Linn.)	Panchang	16 part
2.	Vacha	Acorus calamus Linn	Mool	1 part
3.	Kustha	Saussurea lappa CB.Clarke	Mool	1part
4.	Sankhapuspi	Convolvulus pluricaulis Choisy	Panchang	1part
5.	Ghrita	Bacopa monnieri (Linn.)		4 part

Symptoms	Mean		Mean difference	% Relief	SD	t value	p value	Remark
	BT	AT						

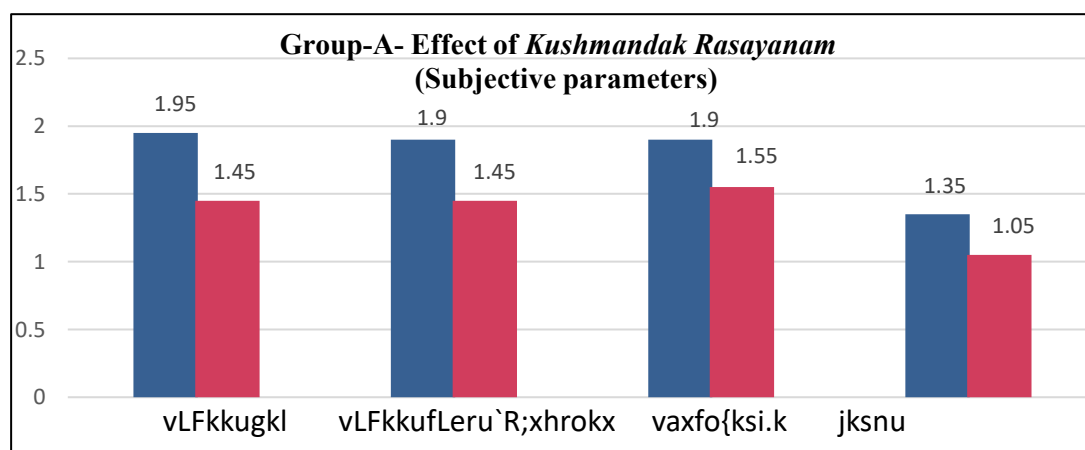
Inattention	23.90	23.15	0.75	3.14	1.446	2.319	0.032	S
Hyperactivity/impulsivity	23.90	23.65	0.25	1.05	0.444	2.517	0.021	S
Oppositional	71.15	70.90	0.25	0.35	0.444	2.517	0.021	S
Cognitive problem	64.00	55.50	8.5	13.28	6.211	6.120	0.000	HS
Hyperactivity	75.00	74.65	0.35	0.47	0.587	2.666	0.015	S
ADHD index	64.70	64.50	0.20	0.31	0.410	2.179	0.042	S



Graph No.:01 Effect of Kushmandak Rasayanam (Subjective and Objective parameters)

Table No. 06 - Group-A- Effect of Kushmandak Rasayanam (Subjective parameters)

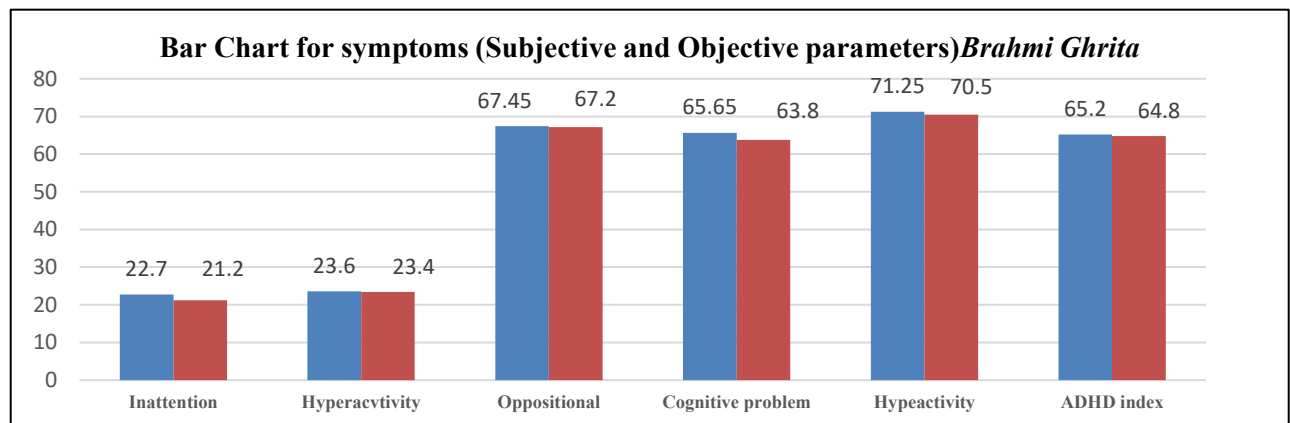
Symptoms	Mean		Mean difference	% Relief	Z value	p value	Remark
	BT	AT					
Asthanhas(Laugh without reason)	1.95	1.45	0.50	25.64	2.271	0.023	S
Asthanasmitnritiyagivag(s houts and sing and dance without at inappropriate times)	1.90	1.45	0.45	23.68	2.251	0.024	S
Angvikshepad (Fidget with hand or feet)	1.90	1.55	0.35	18.429	2.646	0.008	HS
Rodan (cry without any reason)	1.35	1.05	0.30	22.22	2.121	0.034	S



Graph No.:02 Effect of Kushmandak Rasayanam (Subjective parameters)

Group B - Brahmi Ghrita**Table No. 07- Group-B- Effect of Brahmi Ghrita (Subjective parameters Objective parameters)**

Symptoms	Mean		Mean difference	% Relief	SD	t value	p value	Remark
	BT	AT						
Inattention	22.70	21.20	1.50	6.61	1.277	5.252	0.000	HS
Hyperactivity/impulsivity	23.60	23.40	0.20	0.85	0.410	2.179	0.042	S
Oppositional	67.45	67.20	0.25	0.37	0.444	2.517	0.021	S
Cognitive problem	65.65	63.80	1.85	2.82	1.725	4.796	0.000	HS
Hyperactivity	71.25	70.50	0.75	1.05	1.293	2.595	0.018	S
ADHD index	65.20	64.80	0.40	0.61	0.754	2.373	0.028	S

**Graph No.: 03 Effect of Brahmi Ghrita (Subjective and Objective parameters)****Table No. 08- Group-B- Effect of Brahmi Ghrita (Subjective parameters)**

Symptoms	Mean		Mean difference	% Relief	Z value	p value	Remark
	BT	AT					
Asthanhas (Laughs without reason)	1.85	1.55	0.30	16.22	2.449	0.014	S
Asthasmitnityagatvag (shouts and sing and dance without at inappropriate times)	1.90	1.65	0.25	13.16	2.236	0.025	S
Angvikshepad (Fidget with hand or feet)	1.90	1.65	0.25	13.16	2.236	0.025	S
Rodan (cry without any reason)	1.35	1.05	0.30	22.22	2.449	0.014	S

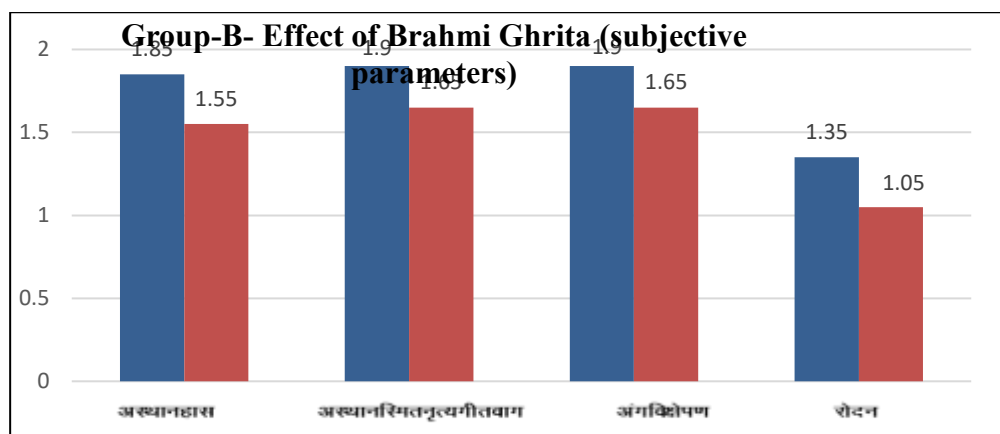
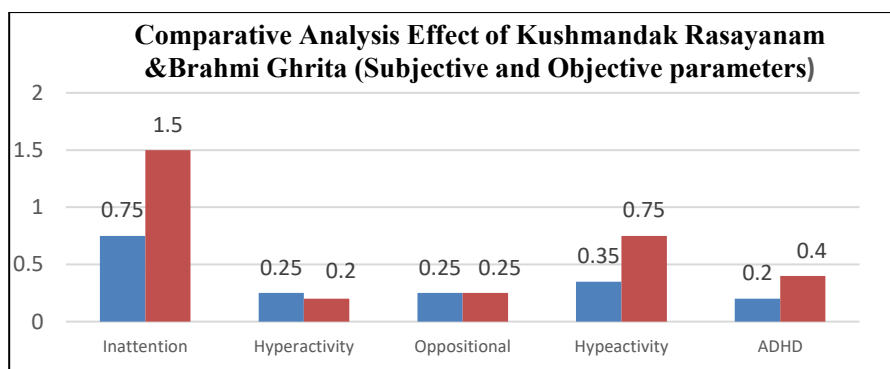
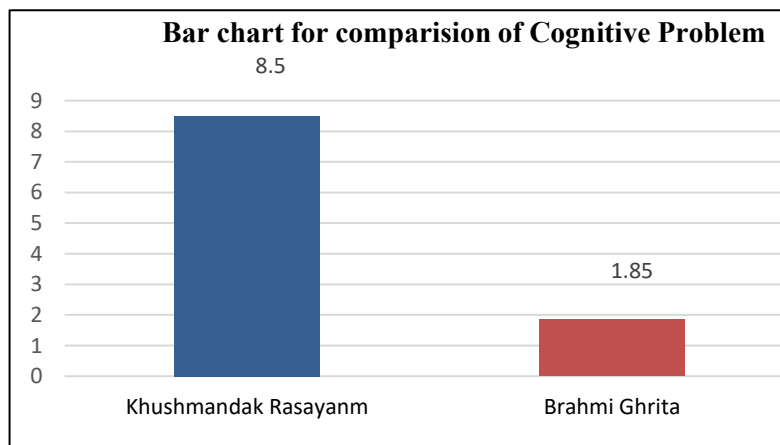
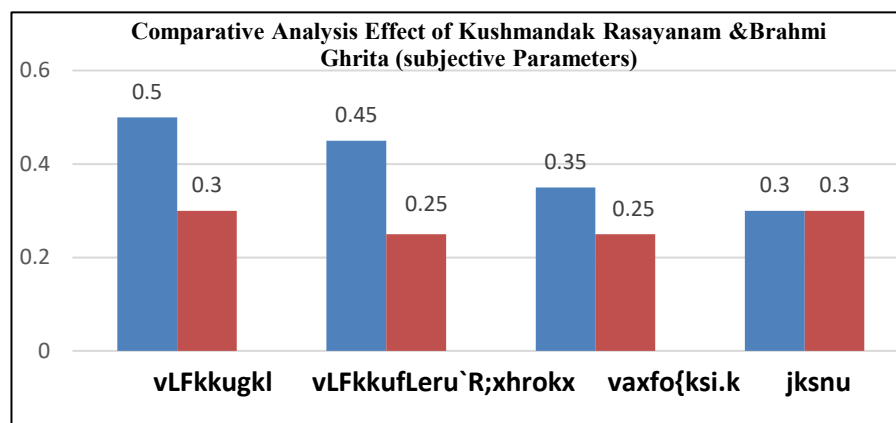
**Graph No.: 04 Effect of Brahmi Ghrita (Subjective parameters)**

Table No. 09: Comparative Analysis Effect of Kushmandak Rasayanam & Brahmi Ghrita (Subjective and Objective parameters)

Variable	Mean		SD		t value	p value	Remark
	Kushmandak Rasayanam	Brahmi Ghrita	Kushmandak Rasayanam	Brahmi Ghrita			
Inattention	0.75	1.50	1.446	1.277	1.738	0.090	NS
Hyperactivity/ Impulsivity	0.25	0.20	0.444	0.410	0.370	0.714	NS
Oppositional	0.25	0.25	0.444	0.444	0.000	1.000	NS
Cognitive Problem	8.50	1.85	6.211	1.725	4.613	0.000	HS
Hyperactivity	0.35	0.75	0.587	1.293	1.260	0.219	NS
ADHD	0.20	0.40	0.410	0.754	1.042	0.306	NS

**Graph No.:05 Comparative Analysis of the Effect of Kushmandak Rasayanam & Brahmi Ghrita (Subjective and Objective parameters)****Graph No.:06 Comparative Analysis of the Effect of Kushmandak Rasayanam & Brahmi Ghrita (Cognitive problem)****Table No. 10 : Comparative Analysis Effect of Kushmandak Rasayanam & Brahmi Ghrita (Subjective Parameters)**

Variable	Mean		Z value	p value	Remark
	Kushmandak Rasayanam	Brahmi Ghrita			
Asthanhas	0.50	0.30	0.403	0.758	NS
Asthasmitnityagitvag	0.45	0.25	0.606	0.640	NS
Angvikshepad	0.35	0.25	0.681	0.602	NS
Rodan	0.30	0.30	0.244	0.862	NS



Graph No.:07 Comparative Analysis of the Effect of Kushmandak Rasayanam & Brahmi Ghrita (Subjective Parameters)

Discussion On Result

Kushmandak Rasayanam

In the drugs of Kushmandak Rasayanam chemistry, all have Ushna Virya (hot potency), which pacifies Vata. Along with this, due to its Madhur Rasa, the neurological system is stimulated by the Katu Rasa. In addition to increasing circulation and neural responsiveness, Isphutikroti indriyani¹¹, means it stimulates the senses or nerve cells of the brain. The Snigdha quality of this formulation is designed to diminish the excess Vata associated with Unmad. Simultaneously, its Ushna Virya will alleviate the Sheettata of aggravated Vata in the brain, stimulate the Manovah Strotas (Neural network), and cleanse the channels owing to its Tikshna properties. Kushmandak Rasayanam is a combination of medicines that work on both mental and physical health. The chemical substances of Kushmandak Rasayanam can cross the blood–brain barrier and increase the production of neurotrophic factors in the brain and regulate neurotransmitter levels, the antidepressive, antioxidant, against neuroinflammation and ability to activate junctional signalling. In Ayurveda, the properties of Pakkva Kushmunda is Ushna, Laghu and Skahariya; it acts as a Tridoshar¹².

Kushmunda affects brain function via various neurochemical pathways. The seponin facilitates remyelination and functional recovery in demyelinating diseases by boosting the remyelination process mediated by oligodendrocyte progenitor cells, enhancing spatial memory and motor function. Additionally, it promotes the release of glutamate, potentially via a Ca²⁺/calmodulin-dependent protein kinase II (CaMKII)-dependent pathway, thereby regulating neurotransmitters in the central nervous system to improve learning and memory. It enhances excitatory signalling, which may enhance attention¹³.

Compounds such as β -sitosterol mitigate oxidative stress, activate the cyclic adenosine monophosphate (cAMP) signalling pathway, prevent the dopamine hypothesis and promoting neuronal functions. Furthermore, the triterpenoids modulates monoamine oxidase (MAO) and catalyse or break down dopamine to norepinephrine, which helps to reduce hyperactivity. Additionally, vitamin B supports myelin formation, thereby enhancing nerve conduction, and as well as Kushmunda is rich in vitamin C, which promotes the activity of Dopamine β -hydroxylase, which helps to convert dopamine into norepinephrine¹⁴.

At the same time, flavonoids have potential value in protecting neurons from damage caused by neurotoxins and neuroinflammation, activating junctional signalling, and the ability to improve cerebral blood flow; it fortifies inhibitory control by increasing GABA neurotransmission, thereby helping to diminish impulsivity¹⁵.

Pippali (piperine) and Marich (piperine) serve as agents that inhibit MAO-B, which decreases the breakdown of neurotransmitters and enhances their availability¹⁶ and piperlonguminie in pippali increases striatal dopamine levels and protective effects on mitochondrial complex I activity¹⁷.

The zingerone in Shunthi targets the neurons and enhances learning and memory while also inducing anxiolytic and anti-depressive effects through the enhancement of cholinergic transmission, improvement of antioxidant status, and modulation of serotonin and dopamine levels¹⁸.

Apigenin in jeerak demonstrates significant inhibitory effects on monoamine oxidase; apigenin's actions are likely associated with multiple biochemical mechanisms, including the modulation of brain monoamine, serotonin, and dopamine levels¹⁹.

Cinnamaldehyde in Darusita crosses the blood–brain barrier and influences the gut–brain axis, thus improving signalling efficacy. Thereby facilitating the synthesis of dopamine and norepinephrine²⁰.

Ela (α -terpineol) aids cerebral metabolism and offers neuroprotection. Terpineol functions as a neuromodulatory agent, mitigating these effects through two closely related mechanisms: Dopamine D2 receptor activation. Molecular docking studies and behavioural observations indicate that terpineol acts as a functional agonist for the D2 receptor, or otherwise enhances its signalling²¹.

Dhanyak (linalool) boost the activity of tyrosine hydroxylase, modulate dopamine levels and expression of inflammatory enzymes like cyclooxygenase (COX)²².

Ghrita effectively calms both Vata and Pitta doshas²³ and functions as an excellent Yogavahi, which is a carrier that boosts the potency and absorption of other components in the formulation. Collaborating with Mridu and Soumya

The Snigdha Guna of Khandsita directly counters Ruksha, providing a coating and soothing effect on the nervous system in individuals with ADHD or Vataj Unmad²⁶. ADHD isn't clearly caused by sugar. It's been suggested that certain dietary factors, such as a high sugar intake, can have an impact on attention deficit/ hyperactivity disorder (ADHD)²⁷.

[illegible]

The diagram illustrates the neuroprotective effects of various phytochemicals. The central focus is on the regulation of neurotransmitter levels (dopamine and norepinephrine) and the triggering of apoptotic effects. The phytochemicals and their mechanisms are as follows:

- Dhanyak (linalool)**: tyrosine hydroxylase activity, Cross BBB.
- Pippali (piperine)**: MAO-B inhibitor activity, Cross BBB.
- Marich (permeke) & pipel longumane**: MAO-B inhibitor activity, Cross BBB.
- Ela (α-terpineol)**: neuroprotective effect, cerebral metabolism, Cross BBB.
- Jeevak (apigenin)**: Inhibit oxidative stress, Cross BBB & play a role in gut-brain axis.
- Ghrta**: Maintain the flexibility of neural membranes.
- Shunthi (Zingerone)**: Triggered apoptotic effect.
- Darusini (Cinnamaldehyde)**: metabolized into (NaB), regulate neurotransmitter levels.

The central outcome is **↑ dopamine & norepinephrine**, which leads to **Triggered apoptotic effect**.

[illegible]

Figure No.-03 Ayurvedic probable Mode of action of Kushmandak Rasayanam

Effect Of Kushmandak Rasayanam

The study findings show a reduction in the mean ADHD score (Inattention) from 23.90 before treatment to 23.15 after treatment with Kushmandak Rasayanam. This decrease suggests a mild improvement in symptoms of Attention-Deficit/Hyperactivity Disorder, such as inattention.

The β -sitosterol in Kushmunda mitigates oxidative stress and helps optimise the levels and signalling of DA (dopamine) and serotonin (5-HT). Activate Cyclic Adenosine Monophosphate (cAMP) signalling pathway, prevents the dopamine hypothesis and promotes neuronal functions, increasing attention and concentration.

In Hyperactivity/impulsivity ADHD score from 23.90 before treatment to 23.65 after treatment, In Kushmandak Rasayanam, due to the anxiolytic effect of its ingredients, there is a decrease in this symptom. Chemicals like flavonoids and triterpenoids help reduce impulsivity and hyperactivity in the ADHD brain. The study findings show a reduction in the mean ADHD score from 71.15 before treatment to 70.9 after treatment with Kushmandak Rasayanam, so the effect of the drug on oppositional has been shown to be significant.

The effect of the drug on cognitive problems has been shown to be highly significant (64.0 before treatment to 55.0 after treatment) and reduction in the mean ADHD score from 64.70 before treatment to 64.5 after treatment with Kushmandak Rasayanam; the effect of the drug on the ADHD Index has been shown to be significant.

Asthanhas is the result of the distortion of Prana Vayu because it regulates the nerves in the brain and both excitatory and inhibitory neurotransmitters. Kushmandak Rasayanam has shown significant (Mean score - 1.95 before treatment and 1.45 after treatment) effects on this condition due to the modulatory effects of several ingredients. Kushmandak Rasayanam has been found to be significant (Mean score - 1.90 before treatment and 1.45 after treatment) in Asthanasmitnriyagitvag; Kushmandak Rasayanam has been found to be highly significant (Mean score - 1.90 before treatment and 1.55 after treatment) in Angvikshepad ($P < 0.001$). Kushmandak Rasayanam enhances the activity of tyrosine hydroxylase which produces dopamine. Because of this effect, a decrease in Angvikshepad has been observed. Due to the anxiolytic and mild sedative effects of Kushmandak Rasayanam, it has been shown to be significant (Mean score - 1.35 before treatment and 1.05 After treatment) in Rodan in children with Vataj Unmad.

Brahmi Ghrita

Bacopa monnieri, a key ingredient in Brahmi Ghrita, is extensively researched for its therapeutic benefits. Its antioxidant properties are believed to be responsible for its anti-stress, immunomodulatory, cognition-enhancing, anti-inflammatory, antidepressant and anti-ageing effects 28.

The chemicals in Brahmi known as bacosides (A and B) balance the dopaminergic system and inhibit AChE (acetylcholinesterase) which reduces the breakdown of acetylcholine 29.

The Volatile oils (essential oils), α -asarone and β -asarone of Vacha are highly lipophilic phenylpropanoids and modulate GABAA receptors, 30.

ADHD children show a lack of attention; the bacosides in Brahmi which balance dopamine and norepinephrine, play a major role in attention, so the data show highly significant (Mean value before treatment -22.70 and after treatment-21.20) ($P = 0.00$) symptoms in ADHD

Bacosides of the Brahmi Ghrita stop acetylcholinesterase which boosts acetylcholine for better memory and processing. It also helps with brain cell growth and repair in the hippocampus and its Ghee base helps it get into the brain for better long-term memory, so the data show highly significant improvement (Mean value before treatment - 65.65 and after treatment-63.80) ($P = 0.00$) in symptoms in Vataj Unmad or ADHD.

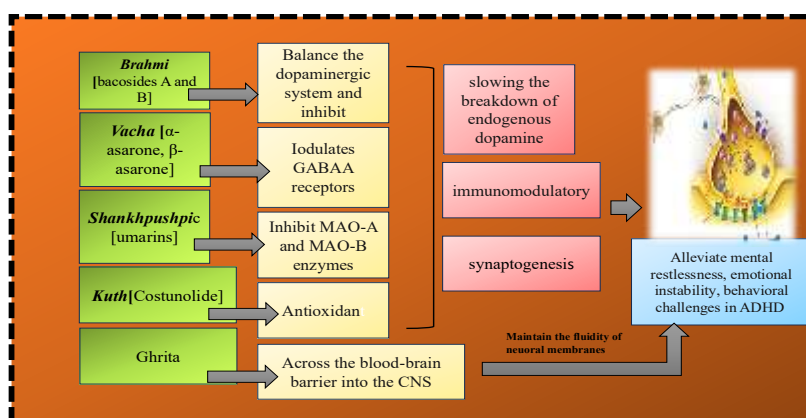


Figure No.-04 Modern probable mode of action of Brahmi Ghrita

Effect Of Kushmandak Rasayanam And Brahmi Ghrita-

The study showed that Kushmandak Rasayanam and Brahmi Ghrita produced comparable effects on five parameters (Inattention, Hyperactivity/Impulsivity, Oppositional, Hyperactivity, ADHD index) the differences are not statistically significant (NS). Only Cognitive Problems in Group A (8.5) showed a highly significant difference (HS) compared to Group B (1.85).

The findings indicate that both treatment modalities were effective in reducing symptom severity. However, Group A demonstrated comparatively better in cognitive problem in children with Vataj Unmad or ADHD as a greater

proportion of children experienced mild to moderate improvement. Major symptoms like Asthanhas (Laughs without reason), Asthasmitnityagivag (shouts and sing and dance without at inappropriate times), Angvikshepad (Fidget with hand or feet), Rodan (cry without any reason) showed, the p-values were above 0.05, suggesting that the results were not statistically significant. Both treatments exhibited similar therapeutic effects, with no notable difference observed between the Groups.

Conclusion

The present clinical study demonstrates that Kushmandak Rasayanam and Brahmi Ghrita were compared, and their use is a safe and effective Ayurvedic medicine for the condition of Vataj Unmad or ADHD (Attention deficit/hyperactivity disorder). The findings indicate that both treatment modalities were effective in reducing symptom severity. Both formulation improving overall comfort, appetite, sleep, and attention, reduce hyperactivity without producing any adverse effects. However, The Kushmandak Rasayanam demonstrated comparatively better in cognitive problem in children with Vataj Unmad or ADHD as a greater proportion of children experienced mild to moderate improvement. Kushmandak Rasayanam elevates dopamine and norepinephrine, enhances synaptic transmission, and reduces oxidative damage, leading to improved attention, reduced hyperactivity, and better cognitive and behavioural outcomes for individuals with Vataj Unmad or ADHD (Attention deficit/hyperactivity disorder).

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