



A Comparative Clinical Study to Assess the Medhya Effect of Pathadi Ghrita and Vacha Rasayana In School Going Children

Dr. Aasha Kaushik^{1*}, Dr. Satyawati Rathia², Dr. Neeraj Agrawal³, Dr. Lowkesh Chandravanshi⁴, Dr. Pragma Thakur⁵, Dr. Chandni Sahu⁶, Dr. Suman Singh⁷

¹ MD Scholar, Dept. Of Kaumarbhritya, GAC Raipur, C.G. Email ID: aashakaushik93@gmail.com

²Lecturer, Dept. Of Kaumarbhritya, GAC Raipur, C.G. Email ID: satirathiya@gmail.com

³Professor, Dept. Of Kaumarbhritya, GAC Raipur, C.G. Email ID: dr_neeraj2001in@yahoo.co.in

⁴Professor, Dept. Of Kaumarbhritya, GAC Raipur, C.G. Email ID: lowkeshc@gmail.com

⁵MD Scholar, Dept. Of Kaumarbhritya, GAC Raipur, C.G. Email ID: thakurpragma300@gmail.com

⁶MD Scholar, Dept. Of Kaumarbhritya, GAC Raipur, C.G. Email ID: chandnisahu037@gmail.com

⁷MD Scholar, Dept. Of Kaumarbhritya, GAC Raipur, C.G. Email ID: sumansingh.1610@gmail.com

*Corresponding author- Dr Aasha Kaushik aashakaushik93@gmail.com

Abstract

In the present competitive era, enhancement of cognitive functions in children is essential. Ayurveda describes Medhya Rasayana drugs that improve intellect through Dhi, Dhriti, and Smriti.

Methods: A prospective, interventional, randomized, open-label double-arm clinical study was conducted on 40 children (6–12 years), divided into two groups. Group I received Pathadi Ghrita and Group II received Vacha Rasayana for 30 days with a 30-day follow-up. Assessment was done using subjective parameters and Raven's Progressive Matrices for IQ evaluation

Results: Both groups showed improvement in cognitive parameters and IQ scores, with comparatively better results observed in the Pathadi Ghrita group.

Discussion: The Medhya and neuroprotective properties of the drugs may enhance cognitive functions.

Conclusion: Pathadi Ghrita and Vacha Rasayana are effective in improving intellect in children, with Pathadi Ghrita showing better than Vacha Rasayana.

Keywords: Medhya Rasayana, Pathadi Ghrita, Vacha Rasayana, Intelligence Quotient, Cognitive Function, Ayurveda.

Introduction

In this era of global competition, spirit starts from the very beginning of the childhood of every individual. Even to get admission in a reputed school, the child has to go through various examinations. The early childhood is the phase in which the child perceives and retains unknown words, skilled processes etc. If any drug can enhance this process of grasping, retention and recalling, It will provide a great help to paediatric population¹.

While describing Health, WHO Considered Physical, mental and social acceptance of health, and physical health is directly related to mental health, poor health with poor mental state is responsible for poor Intellectual².

'Medha' refers to intelligence or retention. Medha is mentioned in ayurveda in a wide sense. Medhya is made up of the three mental faculties, Dhee, Dhriti, and Smriti, which are all interconnected. Medhya drug is beneficial in two types of situations; healthy and ill. In order to boost general intelligence in healthy person. In neurological and Psychiatric illnesses, memory loss, cognitive deficiencies, poor mental function, and other intelligence-related symptoms are common. Dhriti, which has control over the functions of Manas is reduced by Rajas Ahara. Other causes include an inability to control one's thoughts, excessive pondering, a lack of confidence, failure to attain set goals, and a person who falls behind³. For the successful survival of man in this competitive world there is a need for promotion of mental health and management if various psychological and psychosomatic problems. In the Era of competitive world, Buddhi/Intelligence is a vital essentiality and this competition spirit is being injected by the society even to the brain of infants and children³. The first evidence of mind(manasa) conceptualized as an inner flame of knowledge is found in Vedic-period i.e. Yajurveda 1200-800BCE, where it is described as a medium for perception and memory. While Atharvaveda mentions consciousness, power, emotion, inspiration is governed by Manas. Later in Charak Samhita, Acharya has elaborated about Manas, its Guna, and Karma. While describing three gunas satva, rajas, and tamas he has mentioned that mental illness is the result of an imbalance in rajas or tamas. Satva never leads to mental disorder and that's why rajas and tamas have been described as mansika doshas.

Intelligence has been defined in many different ways including, but not limited to, abstract, understanding, self-awareness, communication, reasoning, learning, having emotional knowledge, retaining, planning and problem solving⁴.

Aim & Objectives

The study aimed to evaluate Medhya (Dhee, Dhriti, and Smriti) according to Ayurveda and contemporary science, analyze Pathadi Ghrita and Vacha Rasayana, assess changes in Intelligence Quotient, and evaluate academic stress in school-going children.

Materials & Methods

An open-label, randomised, double-arm study was conducted on 40 children aged 6-12 years at the Department of Kaumarbhritya, Shri Khudadad Dungaji Government Ayurvedic Hospital, Raipur(C.G.).

Inclusion Criteria

Children aged between 6–12 years, irrespective of gender and socioeconomic status, who were willing and able to participate in the study and had an Intelligence Quotient (I.Q.) ranging from 70–124, were included in the study.

Exclusion Criteria

Children below 6 years and above 12 years of age, children with congenital anomalies, CNS disorders, systemic disorders such as T.B. and HIV, and metabolic disorders were excluded from the study.

Withdrawal Criteria

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

Assessment Criteria(Subjective)

The study assessed Dhi (power of grasping), Dhriti (power of retention), Smriti (memory), and Vigyanvyavsayen (ability), Stress, Appetite which are considered important components of Medhya in Ayurveda.

Assessment Criteria(Objective): Evaluation Of Iq –

Intellectual assessment - Raven's Progressive Matrices Test (Dr. John C. Raven in 1936 in the UK)⁵

Table No.01- Material of Pathadi Ghrita

S.NO.	Drug	Botanical Name	Part Use	Ration	Quantity
1.	Patha ⁶	Cissampelos pareira Linn	Panchang	1part	500g
2.	Vacha ⁶	Acorus calamus Linn	Stem	1part	500g
3.	Shigru ⁶	Moringa oleifera Lam.	Bark	1part	500g
4.	Haritaki ⁶	Terminalia chebula Retz.	Fruit	1part	500g
5.	Sunthi ⁶	Zingiber officinale Rosc.	Rhizome	1part	500g
6.	Marich ⁶	Piper nigrum Linn	Fruit	1part	500g
7.	Pippali ⁶	Piper longum Linn	Fruit	1part	500g
8.	Sandhav ⁷	Rock- Salt	-	1part	500g
9.	Navanit ⁷	Butter Milk	-	4 Guna	16kg
10.	Water	-	-	16 Guna	64lit.

COLLECTION OF DRUGS:

Raw material i.e. Patha(Panchang), Vacha(Root), Shigru(Bark), Haritaki(Fruit), Shunthi(Rhizome), Marich(Fruit), Pippali(Fruit), Sandhav, Navaneet were purchased from local Ayurvedic raw drug market in Raipur chhattishgarh.

PREPRATION OF PATHADI GHRITA:

Pathadi Ghrita was prepared in the Department of Rasashastra and Bhaishajya Kalpana, Government Ayurvedic College, Raipur, Chhattisgarh. The ingredients were coarsely powdered, soaked overnight in water, and processed with prepared ghee obtained from navanita (butter). The mixture was cooked with sixteen times water on mild heat, reduced to half, filtered, and finally 10 kg of medicated Pathadi Ghrita was obtained.

Table No. 02: Material of Vacha Rasayana

S.NO.	DRUG	BOTANICAL NAME	PART USE	QUANTITY
1.	Vacha ⁶	Acorus calamus Linn	Stem	2.5kg

PREPRATION OF VACHA RASAYANA:

Vacha (Shodhit rhizome of *Acorus calamus*) was procured from the local Ayurvedic raw drug market and authenticated by a Dravyaguna expert. The rhizomes were cleaned, shade dried, pulverized into fine powder, sieved through an 80# mesh for uniformity, and stored in airtight containers for clinical use.

POSODOLOGY

Advice	Route/Dose/Form/Freq uency/ Anupana	Duration of Treatment	Follow-ups during Treatment	Post Treatment Follow ups	Instructions
GROUP-I	Oral/Ghrita/Dose According to young's formula, twice a day with Madhu(unequal) Doses for child = Adult dose× $\frac{\text{Age}}{\text{Age}+12}$	30 Days	Every 15th days	Every 15 th days till 30 days	Routine diet and other food instructions. Avoid junk food Products and parents counseling.
Pathadi ghrita ⁸					
GROUP-II	Oral/Churna/Dose According to young's formula,twice a day with Madhu Doses for child = Adult dose× $\frac{\text{Age}}{\text{Age}+12}$	30 Days	Every 15th days	Every 15 th days till 30 days	Routine diet and other food instructions. Avoid junk food Products and parents counseling.
Vacha Rasayana ⁹					

Age	Dose of medicine(twice a day)	
	Young's formula ¹⁰ – Doses for child = Adult dose × $\frac{\text{Age}}{\text{Age}+12}$ _____	
	Pathadi Ghrita	Vacha Rasayana
6 - 8 year of Age	10 ml BD in divided dose	50 mg BD divided dose
9 - 12 year of Age	15 ml BD divided dose	70 mg BD divided dose

OBSERVATION:

The present study With particular attention to Dhi (grasping power), Dhriti (retention power), Smriti (memory), and Intelligence Quotient (IQ), the current study was carried out to assess the Medhya effect of Pathadi Ghrita and Vacha Rasayana in school-age children. Medhya Rasayana is described by Ayurveda as a medication that can enhance intelligence, memory, learning capacity, and mental function. The Medhya, Rasayana, neuroprotective, antioxidant, adaptogenic, and nootropic qualities of the constituents in the formulations may be responsible for the improvements seen in both groups.

Results

Subjective

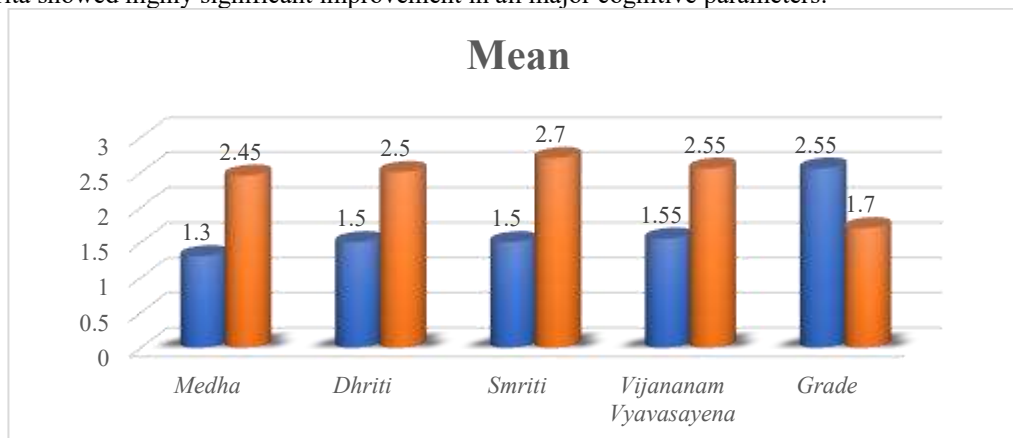
Group A – Pathadi Ghrita

Table No.03: Group A – Effect of Pathadi Ghrita

Variable	Mean		Mean Improvement	% Relief	Z value	p value	Remark
	BT	AT					

Medha	1.30	2.45	1.15	88.46%	4.234	0.000	HS
Dhriti	1.50	2.50	1.00	66.67%	3.911	0.000	HS
Smriti	1.50	2.70	1.20	80.00%	4.233	0.000	HS
Vijananam Vyavasayena	1.55	2.55	1.00	64.52%	4.123	0.030	S
Grade	2.55	1.70	0.85	33.33%	4.123	0.000	HS

Pathadi Ghrita showed highly significant improvement in all major cognitive parameters:

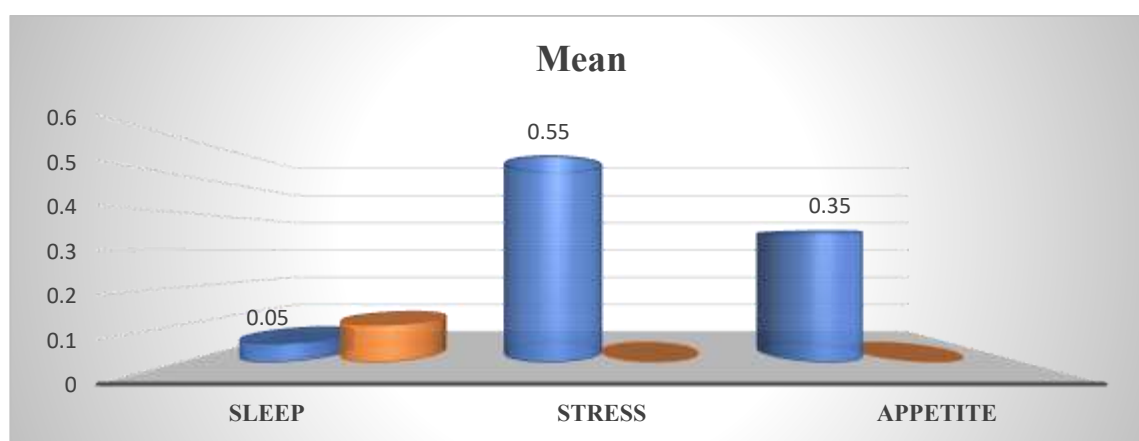


Graph No.01: Bar chart showing Mean (Medha,Dhriti,Smriti,Vijanam Vyavasayena,IQ Grade)

These results demonstrate that Pathadi Ghrita has a **highly significant Medhya effect**, improving all domains of cognition.

Table No.04: Associated Parameters (Sleep,Stress,Appetite)

Variable	Mean		Mean difference	% Improvement	Z value	p value	Remark
	BT	AT					
Sleep	0.05	0.10	0.05	100.00%	2.053	0.040	S
Stress	0.55	0.00	0.55	100.00%	2.326	0.020	S
Appetite	0.35	0.00	0.35	100.00%	2.170	0.030	S

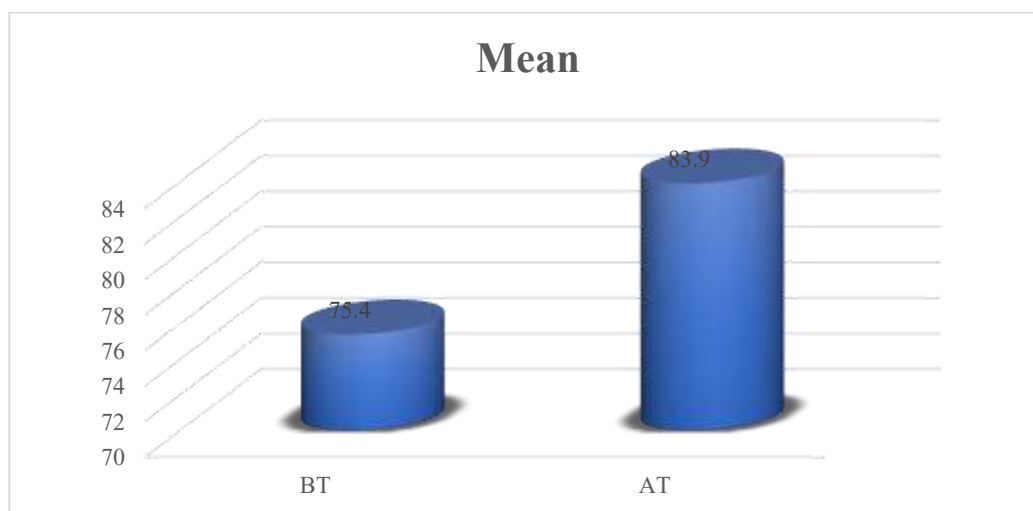


Graph No.02: Bar chart showing Mean Subjective Parameters BT and AT(Sleep,Stress,Appetite)

Objective

Table No.05: Effect on Intelligence Quotient (IQ)

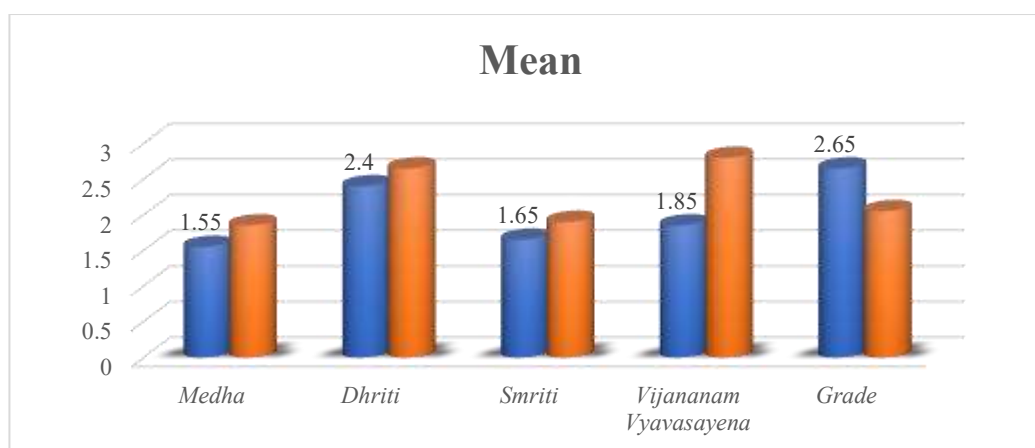
Advance Progress Metrecs test	Mean	Mean difference	% Relief	SD	t value	p value	Remark
BT	75.40	8.50	11.27	5.632	9.488	0.000	HS
AT	83.90			7.504			



Graph No.03: Bar chart showing Effect on Intelligence Quotient (IQ)

Group B – Vacha Rasayana**Table No.05: Effect of Vacha Rasayana**

Variable	Mean		Mean Improvement	% Relief	Z value	p value	Remark
	BT	AT					
Medha	1.55	1.85	0.30	19.35%	2.449	0.014	S
Dhriti	2.40	2.65	0.25	10.42%	2.236	0.025	S
Smriti	1.65	1.90	0.25	15.15%	2.236	0.025	S
Vijananam Vyavasayena	1.85	2.80	0.95	51.35%	2.053	0.040	S
Grade	2.65	2.05	0.60	22.64%	2.170	0.030	S

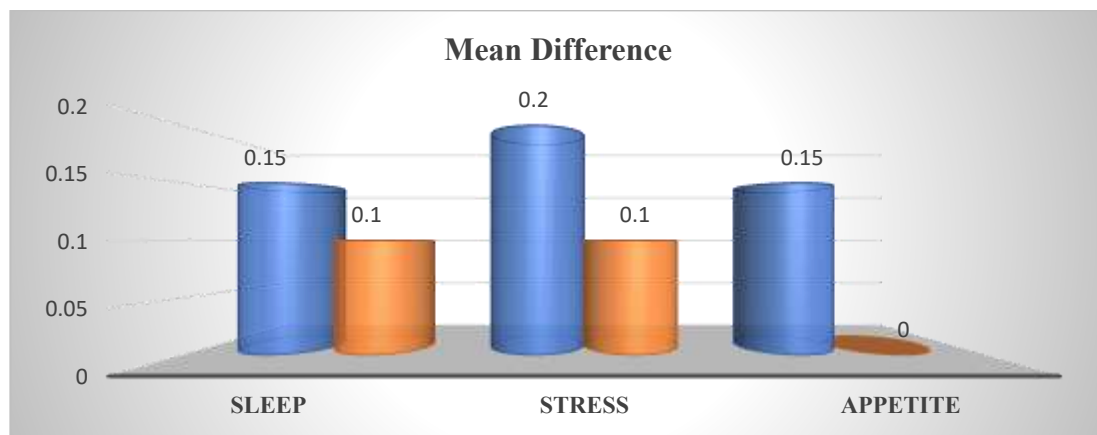


Graph No.04: Bar chart showing (Medha,Dhriti,Smriti,Vijanam Vyavasayena,IQ Grade)

Thus, Vacha Rasayana demonstrated statistically significant improvement, but the magnitude of effect was lower compared to Pathadi Ghrita.

Table No.06: Associated Parameters (Sleep,Stress,Appetite)

Variable	Mean		Mean difference	% Improvement	Z value	p value	Remark
	BT	AT					
Sleep	0.15	0.10	0.05	33.33%	1.732	0.083	NS
Stress	0.20	0.10	0.10	50.00%	1.414	0.157	NS
Appetite	0.15	0.00	0.15	100.00%	1.732	0.083	NS

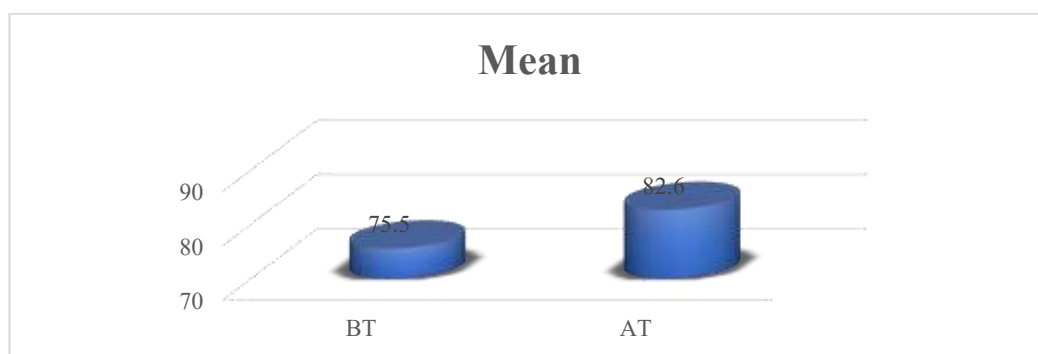


Graph No.05: Bar chart showing Associated Subjective Parameters BT and AT (Sleep, Stress, Appetite)

Objective

Table No.07: Effect on Intelligence Quotient (IQ)

Advance Progress Metres test	Mean	Mean difference	% Relief	SD	t value	p value	Remark
BT	75.50	7.10	9.40	6.605	9.170	0.000	HS
AT	82.60			6.984			



Graph No.06: Bar chart showing Effect on Intelligence Quotient (IQ)

DISCUSSION ON RESULT

Pathadi Ghrita: Patha, Vacha, Shigru, Haritaki, Shunthi, Maricha, Pippali, Saindhava, and Ghrita (Extract from Navneet) are all included in Pathadi Ghrita. In Ayurveda, ghrita is regarded as a superior Yogavahi and Sukshma Anuvarti that helps active principles enter subtle channels, such as the central nervous system. Ghrita is high in phospholipids and critical fatty acids that promote neurotransmission and the integrity of neuronal membranes¹¹. Studies suggest that lipid-based formulations improve bioavailability of phytochemicals and enhance cognition by supporting synaptic plasticity and neuronal signaling¹². **Patha** (*Cissampelos pareira*) contains alkaloids such as hayatinine and cissamine, which exhibit antioxidant and neuroprotective activity¹³. Antioxidants assist memory and learning processes by improving neuronal survival and reducing oxidative stress-induced neuronal damage.

One of the most significant Medhya medications mentioned in Ayurveda is **Vacha** (*Acorus calamus*). It has volatile oils, acorin, α -asarone, and β -asarone. According to reports, β -asarone contains cholinergic, antioxidant, neuroprotective, and cognitive-enhancing qualities¹⁴. Experimental studies demonstrate that β -asarone improves learning and memory through modulation of acetylcholine levels and reduction of oxidative stress in hippocampal neurons¹⁵. Additionally, vacha increases attentiveness and brain circulation, which improves Dhi and Smriti. Flavonoids, quercetin, kaempferol, vitamin C, and polyphenols are all present in **shigru** (*Moringa oleifera*). These phytochemicals have anti-inflammatory and antioxidant properties that shield neurons from damage from free radicals¹⁶. Quercetin has been shown to improve cognitive performance and memory by reducing neuroinflammation and enhancing synaptic activity¹⁷.

Haritaki (*Terminalia chebula*) contains chebulinic acid, gallic acid, tannins, and ellagic acid. These compounds possess strong antioxidant effects and reduce neuronal degeneration caused by oxidative stress¹⁸. In Ayurveda, haritaki is also known as Medhya and Rasayana because it enhances mental clarity and promotes normal nervous system activity. Gingerols and shogaols, which have anti-inflammatory and antioxidant properties, are found in **shunthi** (*Zingiber officinale*). Ginger increases neurotransmitter activity and cerebral blood flow, which enhances focus and attention¹⁹.

Maricha (*Piper nigrum*) contains piperine, while **Pippali** (*Piper longum*) contains piperlongumine and piperine. Piperine is known to enhance bioavailability of drugs and phytochemicals through inhibition of hepatic and intestinal

glucuronidation²⁰. Additionally, piperine enhances cognitive performance via regulating dopamine and serotonin neurotransmission²¹. These activities might have improved the formulation's overall therapeutic efficacy²². **Saindhava** Lavana increases the metabolic availability of nutrients and active substances by improving digestion and absorption. According to Ayurveda, optimal brain function depends on proper Agni and nutritional assimilation. **Navanita** (fresh butter) acts as a Medhya, Brimhana, Balya, and Ojas-enhancing substance. Being rich in lipids and fat-soluble nutrients, Navanita nourishes nervous tissue and supports higher cognitive functioning. Lipid-based preparations are known to facilitate blood-brain barrier penetration of phytochemicals, thereby potentiating the neuroprotective effects of Medhya drugs. The synergistic nootropic impact of these compounds may be the reason for the notable improvement in **Medha** (88.46%), **Smriti** (80%), and **Dhriti** (66.67%) in Group A. Because ghrita-based formulations are lipophilic, they can pass across the blood-brain barrier and deliver active phytochemicals straight to neuronal regions²³. An improvement in **Vijananam Vyavasayena** indicates an improvement in analytical and decision-making skills, which could be linked to better cortical processing and neurotransmitter activity. The notable rise in IQ from 75.40 to 83.90 suggests improved cognitive processing and abstract reasoning. The Raven's Progressive Matrices evaluate nonverbal reasoning and problem-solving skills, which are primarily linked to frontal brain activation. Pathadi Ghrita contains neuroprotective and antioxidant phytochemicals that may enhance synaptic transmission and neural connection, improving cognitive function²⁴.

Pathadi Ghrita may also improve cognitive performance indirectly through enhancement of **appetite** and digestion. In Ayurveda, proper functioning of Agni is considered essential for adequate nourishment of Dhatus and optimal functioning of the brain. Impaired appetite and digestion can lead to inadequate nutritional assimilation, which negatively affects mental development, concentration, and memory in children. Ingredients such as Shunthi, Maricha, Pippali, and Saindhava Lavana possess Deepana and Pachana properties that stimulate digestive fire, improve appetite, and enhance absorption of nutrients and active phytoconstituents. Piperine present in Maricha and Pippali has been reported to increase digestive enzyme activity and improve gastrointestinal absorption and bioavailability of nutrients and drugs²⁵. Gingerols present in Shunthi stimulate gastric motility and digestive secretions, thereby improving appetite and metabolism²⁶. Improved nutritional status and better metabolic assimilation may support neurotransmitter synthesis, neuronal energy metabolism, and overall cognitive functioning in children. The observed improvement in appetite and digestion in Group A might therefore have contributed indirectly to enhancement of Medha, Smriti, Dhriti, and IQ scores. Ayurveda explains this effect through proper nourishment of Majja Dhatu and balanced functioning of Manovaha Srotas resulting from correction of Agni and improved Ahara Rasa circulation.

Chronic **stress** and academic pressure in school-going children are associated with increased oxidative stress, elevated cortisol levels, impaired attention, and reduced memory retention. Oxidative stress adversely affects hippocampal neurons and synaptic plasticity, which are essential for learning and memory. The ingredients of Pathadi Ghrita possess antioxidant, neuroprotective, adaptogenic, and stress-modulating activities that may help in reducing stress-induced cognitive impairment. Ghrita acts as a nourishing Medhya Rasayana and supports neuronal membrane stability, while Vacha and other phytoconstituents reduce oxidative neuronal injury and improve neurotransmitter balance. Experimental studies have shown that α - and β -asarone protect hippocampal neurons against oxidative and endoplasmic reticulum stress by reducing reactive oxygen species and activating neuroprotective signaling pathways such as PI3K/Akt/Nrf2/HO-1²⁷. Shunthi, Haritaki, and Shigru contain potent antioxidant phytochemicals that may counter stress-mediated neuroinflammation and neuronal degeneration. Piperine present in Maricha and Pippali enhances bioavailability of active compounds and may improve dopaminergic and serotonergic neurotransmission, thereby supporting emotional stability, concentration, and mental performance during stress conditions. The observed improvement in Medha, Smriti, Dhriti, and IQ in Group A may therefore be attributed not only to cognitive enhancement but also to reduction of stress-induced neuronal dysfunction and improvement in adaptive mental responses. In Ayurveda, this effect can be understood as stabilization of Satva, proper functioning of Manovaha Srotas, and normalization of Vata, which collectively contribute to better intellectual and psychological performance.



Fig.No.01:Effect Of Pathadi Ghrita

Effect on Pathadi Ghrita

In the present study, Pathadi Ghrita showed highly significant improvement in various parameters related to cognitive function and intellectual performance in school-going children. Medha improved by 88.46% ($p < 0.001$), indicating marked enhancement in grasping and comprehension ability. Dhriti showed 66.67% improvement ($p < 0.001$), reflecting better retention and sustaining capacity of the mind. Smriti improved by 80.00% ($p < 0.001$), suggesting considerable enhancement in memory and recall functions. Vijananam Vyavasayena demonstrated 64.52% improvement ($p < 0.05$),

indicating better analytical thinking, discrimination, and decision-making ability. IQ Grade also improved significantly by 33.33% ($p < 0.001$), reflecting an overall rise in intellectual capacity.

Assessment of Intelligence Quotient (IQ) revealed that the mean IQ score increased from 75.40 before treatment to 83.90 after treatment, with a mean difference of 8.50 and percentage improvement of 11.27%, which was statistically highly significant ($p < 0.001$). These findings suggest that Pathadi Ghrita possesses substantial Medhya and cognitive-enhancing effects, possibly due to its neuroprotective, antioxidant, and nootropic properties along with improved nourishment of the nervous system through Ghrita-based delivery.

Vacha Rasayana: Purified Vacha (*Acorus calamus*) is the main component of Vacha Rasayana. In Ayurvedic classics, Vacha is categorized as Medhya, Vatakaphahara, and Smritiprada. The primary active component, β -asarone, has cholinergic, anti-inflammatory, neuroprotective, and antioxidant properties²⁸. Experimental studies have demonstrated that β -asarone improves spatial memory and cognitive function through enhancement of hippocampal neuronal activity²⁹. Additionally, vacha has a stimulant effect on the central nervous system, which may increase processing speed, alertness, and attention span. Vacha's volatile oils boost the oxygen supply to neurons and increase cerebral circulation³⁰. Antioxidant qualities also aid maintain cognitive function by reducing oxidative damage to neural cells. Vacha Rasayana significantly improved her Medha, Dhriti, Smriti, and IQ scores in this study. The stimulating impact of Vacha on higher cortical functioning and mental alertness may be the reason for the somewhat greater improvement in Vijananam Vyavasayena (51.35%). However, the overall improvement was comparatively lesser than that observed with Pathadi Ghrita, possibly due to the presence of Ghrita as a potent carrier medium along with multiple synergistic Medhya and Rasayana drugs in the formulation.. Vacha alone can greatly enhance intellectual performance, as evidenced by the rise in IQ from 75.50 to 82.60. Because acetylcholine is essential for cognition and memory processing, its cholinergic activity may improve learning and memory³¹.



Fig.No.02:Effect Of Vacha Rasayana

Vacha Rasayana also demonstrated significant improvement in cognitive and intellectual parameters in school-going children, although the overall effect was comparatively lesser than that observed with Pathadi Ghrita. Medha improved by 19.35% ($p < 0.05$), indicating improvement in grasping and comprehension ability. Dhriti showed 10.42% improvement ($p < 0.05$), reflecting better retention capacity, while Smriti improved by 15.15% ($p < 0.05$), suggesting enhancement in memory and recall functions. Vijananam Vyavasayena demonstrated comparatively higher improvement of 51.35% ($p < 0.05$), indicating better analytical thinking, mental alertness, and decision-making ability. IQ Grade improved by 22.64% ($p < 0.05$), reflecting enhancement in intellectual functioning.

Assessment of Intelligence Quotient (IQ) revealed that the mean IQ score increased from 75.50 before treatment to 82.60 after treatment, with a mean difference of 7.10 and percentage improvement of 9.40%, which was statistically highly significant ($p < 0.001$). These findings suggest that Vacha Rasayana possesses significant Medhya and nootropic activity, probably due to the cholinergic, neuroprotective, antioxidant, and central nervous system stimulant properties of Vacha (*Acorus calamus*). Although both groups showed highly significant improvement in IQ scores and cognitive performance, Pathadi Ghrita demonstrated slightly superior overall enhancement compared to Vacha Rasayana, possibly due to the synergistic action of multiple Medhya drugs along with the Yogavahi property of Ghrita.

ON COMPARING BOTH GROUPS:

Comparative evaluation showed that both Pathadi Ghrita and Vacha Rasayana improved cognitive and intellectual functions; however, Pathadi Ghrita demonstrated comparatively superior results. Medha, Dhriti, and Smriti showed highly significant improvement in the Pathadi Ghrita group ($p < 0.001$). Vijananam Vyavasayena improved significantly in both groups, with slightly better performance in the Vacha Rasayana group ($p < 0.05$). Stress reduction was significantly greater in the Pathadi Ghrita group ($p < 0.05$), while sleep and appetite showed non-significant differences between the groups. Improvement in IQ Grade was also significantly higher in the Pathadi Ghrita group ($p < 0.001$), indicating better overall cognitive enhancement.

Conclusion

Through improvements in Dhi (grasping strength), Dhriti (retention), Smriti (memory), and Intelligence Quotient (IQ), the current study showed that both Pathadi Ghrita and Vacha Rasayana have significant Medhya effects in school-age children. Both therapies demonstrated statistically significant gains in both objective evaluation using Raven's Progressive Matrices and subjective cognitive measures. However, as compared to Vacha Rasayana, Pathadi Ghrita yielded much better outcomes in Medha, Dhriti, Smriti, stress reduction, and IQ enhancement. The synergistic impact of several Medhya and Rasayana medications in addition to Ghrita, which functions as a powerful Yogavahi and improves the delivery of active phytoconstituents to the central nervous system, may be responsible for Pathadi Ghrita's superior efficacy. Antioxidant, neuroprotective, adaptogenic, cholinergic, and bioavailability-enhancing properties of the ingredients may have contributed to improved neuronal function and cognitive performance.

Vacha Rasayana's position as an effective Medhya Rasayana was demonstrated by its notable improvement, especially in analytical ability and mental alertness. The study backs up the traditional Ayurvedic theory that Medhya Rasayana treatments help improve children's intellectual and cognitive development. Therefore, both formulations may be regarded as safe and helpful for improving academic performance and cognition, with Pathadi Ghrita demonstrating a generally higher level of efficacy.

References

1. Dr. kirti Rathod, Dr. Virendra Kori, Dr. Kalpna Patel and Nilesh Jethava – A double blind study for improving I.Q. of school going children with Guduchi.(WJPMR,2018),262-266.
2. Bajrang Ramawat, Varsha Jangid, Kashinath Samagandi – Review article on the role of Medhya Rasayana:Enhancing the Intellectual Power.(JAIMS,June 2022)
3. Abhimanyu Kumar – A randomized controlled trial on the efficacy of Medhya Rasayana Tablet on Academic stress and performance in school children 2013, Journal of Ayurveda and Holistic Medicine.
4. Article in International Maritime Health - Assessment of intelligence quotient among schoolchildren of fishermen community of Kutch, Gujarat, India June 2014.
5. Vasili A. Vass – Standardization of Raven's Standard Progressive Matrices For Secondary School African Pupils in the Grahamstown Region(January 1992)
6. The Ayurvedic Pharmacopoeia of India.(vol.1, page no.62, 122,138 vol.2- page no.141 163,177 vol.3-page no. 115)
7. Dravyaguna-Vijnana vol.II (vegetable drugs) – Prof. P.V. Sharma , Chaukhambha Bharati Academy Varanasi(India) Edition Reprint 2015.
8. Gadnigraha of Sri Vaidya Sodhala with the Vidyotini Hindi Commentary by Dr. Indradev Tripathi Edition 2005(part- 3), Chaukhambha Sanskrit Sansthan Varanasi.(page no. 543).
9. Vrindamadhava Or Siddha Yoga Edited By Mharshi Vaidya Dayaram Avasthi Shastri Edition 2012 Chaukhambha Sanskriti Bhawan.(page no. 508 shlok no. 12)
10. Meharban Singh Ashok K Deorari– Drug Dosages in Children 10th Edition 2020.(page no.9).
11. Acharya JT. Charaka Samhita. Varanasi: Chaukhambha Surbharati Prakashan; 2011.
12. Sharma R, Martins N. Telomeres, DNA damage and ageing: potential leads from Ayurveda. J Clin Med. 2020;9(8):2544.
13. Gupta M, Mazumder UK. Neuropharmacological activity of Cissampelos pareira. Fitoterapia. 1999;70(2):200-2.
14. Singh R, Sharma PK, Malviya R. Pharmacological properties and Ayurvedic value of Acorus calamus. Int Res J Pharm. 2011;2(1):145-54.
15. Han Y, et al. β -asarone improves learning and memory in experimental models. J Ethnopharmacol. 2013;148(2):492-500.
16. Anwar F, et al. Moringa oleifera: a food plant with medicinal uses. Phytother Res. 2007;21(1):17-25.
17. Spencer JPE. Flavonoids and brain health. Genes Nutr. 2010;5(2):147-57.
18. Saleem A, et al. Antioxidant activity of Terminalia chebula. J Ethnopharmacol. 2002;81(3):327-36.
19. Saenghong N, et al. Effects of ginger on cognitive function. Evid Based Complement Alternat Med. 2012;2012:383062.
20. Atal N, et al. Bioenhancing effect of piperine. Indian Drugs. 1985;22:473-8.
21. Wattanathorn J, et al. Piperine improves cognitive performance. Food Chem Toxicol. 2008;46(9):3106-10.
22. Goyal M, et al. Role of medicated ghee in drug delivery. AYU. 2009;30(4):379-83.
23. Raven JC. Guide to Raven's Progressive Matrices. London: HK Lewis; 1938.
24. Khurana N, et al. Acorus calamus: medicinal properties and pharmacological activities. Int J Pharm Pharm Sci. 2011;3(3):38-46.
25. Srinivasan K. Black pepper and its pungent principle-piperine: a review of diverse physiological effects. Crit Rev Food Sci Nutr. 2007;47(8):735-48.).
26. Mashhadi NS, Ghiasvand R, Askari G, Hariri M, Darvishi L, Mofid MR. Anti-oxidative and anti-inflammatory effects of ginger in health and physical activity: review of current evidence. Int J Prev Med. 2013;4(Suppl 1):S36-S42.
27. Srinivasan K. Black pepper and its pungent principle-piperine: a review of diverse physiological effects. Crit Rev Food Sci Nutr. 2007;47(8):735-48.).
28. Limón ID, et al. Neuroprotective effect of β -asarone. Neurosci Lett. 2009;453(2):98-103.
29. Sharma V, et al. CNS activity of Acorus calamus. J Pharm Res. 2010;3(5):960-2.
30. Dhingra D, et al. Memory enhancing activity of Acorus calamus. J Ethnopharmacol. 2007;114(2):206-10.
31. Johri RK, Zutshi U. Piperine as bioavailability enhancer. J Ethnopharmacol. 1992;37(2):85-91.