



**An observational study to assess the therapeutic effectiveness of Brahmi capsule as experienced by the Ayurveda physicians across India during their clinical practice.**

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**Abstract**

Brahmi (*Bacopa monnieri*) is a traditional herbal medicine that has been in use since the time of the Vedic civilization for cognitive problems. Today the prevalence of Alzheimer's disease among adults (almost 15% of adults of age 65 and above) and learning difficulties among children (between 5 to 15% among school going children) have grown exponentially high. As a result the usage of Ayush drugs related to adult and child psychological disabilities is getting more preference and among them Brahmi maintains its popularity as the most widely used brain tonic in the present era also.

Brahmi capsule is used for improving concentration and for managing the problems related to cognitive functions and speech. It is manufactured by Arya Vaidya Sala Kottakkal, Kerala in the form of capsules which contain 250 mg extract of Brahmi. For assessing the effectiveness and added benefits of it a cross sectional study was done among 220 Ayurvedic physicians who are using Brahmi capsule in their practice on a regular basis. Majority (202) of the physicians opined that they have used the medicine in all of the above mentioned indications either always or occasionally. Brahmi, which is described as Medhya(improves intellect), may directly work on micro-faculties such as Dhi( intelligence), Dhriti (retaining power of mind )and Smriti(memory) and thus helps in treating behavioral issues and learning difficulties. Bacosides are the triterpenoid saponins of prime importance which is found in Brahmi and they have shown the capacity to enhance nerve impulse transmission. The bacosides also promote the repair of damaged neurons

by up-regulating neuronal synthesis and kinase activity. The bacosides also aid in the restoration of synaptic activity, which ultimately leads to proper nerve impulse transmission.

Brahmi capsule is also found to be effective in many conditions like anxiety, tremors, depression related to diabetes, post-surgical fine movement impairment, epilepsy, stammering etc. The present article is based on the survey conducted among the Ayurveda physicians in different parts of India, to assess the effectiveness and additional benefits observed during their clinical practice with Brahmi capsule.

**Key words-**Brahmi, Medhya, Bacosides, Swarya, Dhi

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### **Section 1- Introduction**

A person's behavior is decided by a combination of factors like intelligence, memory, self-control and sound mental health etc. Each year, almost 15% of adults, of age 65 and above who have mild cognitive impairment develop Alzheimer's disease over a period of time<sup>1</sup>. Learning disabilities are neurodevelopmental conditions that impair a person's capacity for information acquisition, processing, or usage. Learning difficulties are a major problem for children in India and many other nations also. However, estimating the precise frequency of learning disorders can be difficult due to a number of factors, including different classifications, diagnostic standards, and study methodology. Various research have produced varying estimates of the prevalence of learning difficulties in India and according to several studies, the prevalence among school going children is between 5% to 15%.<sup>2</sup>

Brahmi (*Bacopa monnieri*) is a traditional herbal medicine that has been used by humans since the time of the Vedic civilization. Its native habitat is marshy places and it is a member of the Scrophulariaceae family. The Sanskrit term Brahmi is derived from Lord Brahma, the Hindu god of creation.

Brahmi maintains its popularity as the most widely used brain tonic and home remedy in the present era also. The consumers of this raw drug include children (even of neonatal age) to nonagenarians. Nowadays drugs related to child psychology or those which corrects learning disabilities is getting higher preference, and the whole world is reluctantly accepting the ancient wisdom of Ayurveda for enhancing memory, intelligence and cognitive functions.

Kashyapa samhita which is the prime text on Koumarabritya (Pediatrics) has given Brahmi an important place among all Medhya drugs. In the available portion of Kashyapa Samhita, Brahmi is mentioned in the first chapter, i.e. Lehaadhyaya.

Brahmi (*Bacopa monnieri*) is selected for the study here primarily due to its Medhya properties but it also shows Mehaghna (anti-diabetic) and Rasayana (rejuvenation) properties along with it. Several studies have also shown its multi-systemic action also.

Brahmi capsule of Arya Vaidya Sala, Kottakkal is prepared in the form of a capsule which contains 250 mg extract of the drug. It is found that Brahmi capsule helps in improving the concentration, intelligence and memory. It is also observed that Brahmi capsule helps to improve speech and sleep. For assessing the effectiveness and added benefits, a cross sectional study was done among 220 Ayurvedic physicians who are using Brahmi capsule in their practice on a regular basis.

The article has been organized in different sections as follows

Section-1- A brief introduction

Section 2- Methodology

Section 3- Observation, Analysis and interpretation of the survey

Section 4- Discussion

Section 5- Conclusion

## **Section 2- Methodology**

### **Objective**

To assess the effectiveness and added benefits of Brahmi Capsule

### **Materials:**

Review of Literature: Compilation of references on Brahmi from *Ayurvedic classics and journals*.

Primary resources:

Bruhattrayi, laghutrayi with available commentaries, classical texts like Bhava prakasha Nighantu and Kayyadeva Nighantu etc.

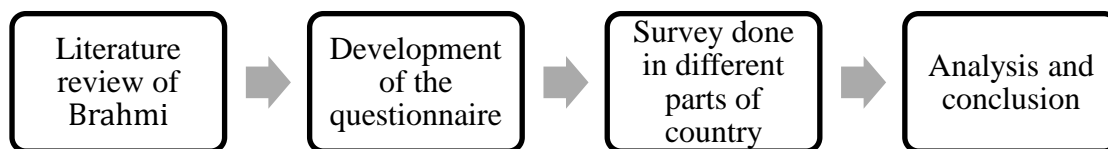
Secondary resources:

Relevant modern literature, previous research works, MD and PhD theses, journals, published research papers and subject related data which is available online etc.

Developed questionnaire-Done face validity- Initially a questionnaire was developed and took expert suggestions. More than 90% of the contents were agreed by the clinical experts with more than 25 years of experience.

## Methods

### Plan of the study



Primary and secondary resources were reviewed in the light of hypothesis and plan of study and necessary materials were compiled. Compiled materials were thoroughly studied, re-arranged and critically analyzed to provide the logical base for the study.

**STUDY DESIGN:** Descriptive Cross sectional study

**STUDY POPULATION:** In the present study, physicians practicing Ayurveda in different parts of India.

**INCLUSION CRITERIA:**

Age group: 25 – 80 years

Sex: Both sex included.

**EXCLUSION CRITERIA:**

Physicians who are not willing to participate.

**SAMPLE SIZE:**

It was calculated by using the following formula:

$$n = \frac{Z_{1-\alpha/2}^2 \overset{\text{Expected Proportion}}{p(1-p)}}{\underset{\text{Absolute Error}}{d^2}}$$

$$Z_{1-\alpha/2} = 1.96$$

$$P = 60\%$$

$$d = 7\%$$

Expecting 60% prevalence of effectiveness of Brahmi capsule and considering a 7% margin of precision, the sample size is calculated as 196. Considering a drop out of 10%, the total sample size is considered as 215.

**Conduct of survey:** Survey was conducted by sending a request form and brief introduction about the study to the participants in the form of a google form.

**DATA COLLECTION:** Primary collection of data with a structured questionnaire through Google form

### **STATISTICAL ANALYSIS**

Cross sectional study- Prevalence will be published in terms of frequency, percentage and Cumulative Percent. Diagrammatic representation of data by tables and figures like Pie diagram and bar diagram etc.

Sub analysis- Crosstabs, Chi-square.

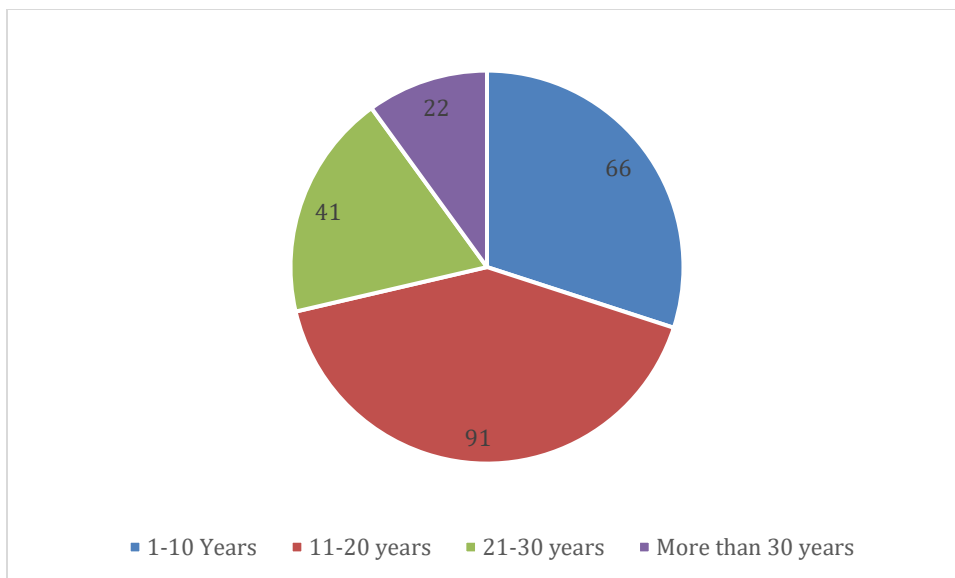
### **Section-3-OBSERVATION, ANALYSIS and INTERPRETATIONS**

#### **1. Clinical experience**

Table 1- Clinical Experience in years

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1-10 Years	66	22.8	29.5	29.5
11-20 years	91	32.3	41.8	71.4
21-30 years	41	14.4	18.6	90.0
More than 30 years	22	7.7	10.0	100.0
Total	220	77.2	100.0	

Figure-1 - Clinical Experience in years



Out of 220 responses, 91(32.3%) physicians having 11-20 years of experiences. 41(15%) having more than 20 years. 22(8%) physicians having more than 30 years of experiences. Out of 220 physicians, 154(70.45%) physicians having more than 10 years of experiences. 63 physicians having more than 20 years of experience.

### Cross tabulation

Table-2-Clinical Experience in years and Effectiveness of Brahmi capsule  
Count

		Effectiveness of Brahmi capsule			Total
		Mild	Moderate	Very Effective	
Clinical Experience in years	1-10 Years	3	28	35	66
	11-20 years	6	30	55	91
	21-30 years	3	18	20	41
	More than 30 years	0	11	11	22
Total		12	87	121	220

The cross tab shows that the effectiveness of Brahmi capsule and the clinical experience as follows. Out of 220 doctors, 121 physicians responded that Brahmi capsule is very effective and 87 doctors opined that it is moderately effective in its indications. 70.45%(154) of physicians having more than 10 years of experience suggested that Brahmi capsule is very effective in the management of memory dysfunction and other indications. (Very effective-action within 21 days, moderately effective-35 days, mildly effective-50 days or more)

**Table-3-Chi-Square Tests**

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.800 <sup>a</sup>	6	.007

The test for association of Effectiveness of Brahmi capsule and Clinical Experience in years got significant association with a P value 0.007(<.05).

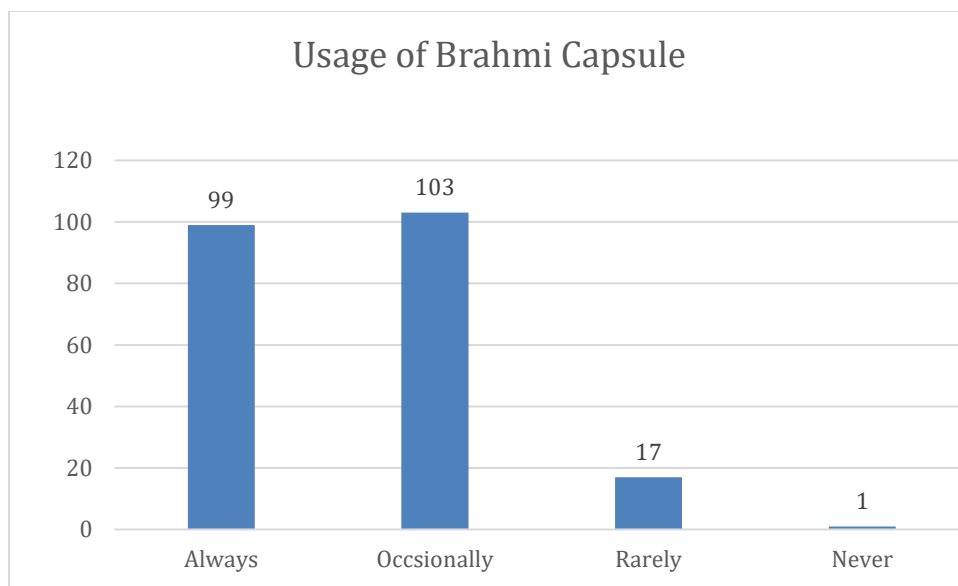
## 2. Usage of Brahmi capsule in clinical practice

**Table-4-Frequency of Brahmi capsule in clinical practice**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	1	.4	.5
	Rarely	17	6.0	7.7
	Occasionally	103	36.1	46.8
	Always	99	34.7	45.0
	Total	220	77.2	100.0

Out of 220 respondents, 99 (34.7 %) have reported that Brahmi capsule is used always in their clinical practice. 103 (36.1%) have reported that it is a drug of choice occasionally in their clinical practice. Out of 220 physicians, 202 physicians are using Brahmi capsule in their practice either always or occasionally. (Prescribes brahmi capsule at least once a week -Always, once in two weeks- occasionally, once in a month-rarely)

## 3. Figure-2- Usage of Brahmi capsule in clinical practice



### The common indication where Brahmi capsule is used

Table-5- Cross tabulation

		Indications of Brahmi capsule				Total
		Improving intelligence & concentration(I&C)and memory	Improving I&C ,memory and sleep	Improving I&C, memory and speech	All indications	
In your clinical practice are you using Brahmi capsule	Never	0	0	0	1	1
	Rarely	5	5	4	3	17
	Occasionally	25	25	29	24	103
	Always	24	33	26	16	99
Total		54	63	59	44	220

Majority (202) of the physicians opined that they were using the medicine in all of its proposed indications either always or occasionally. 44 physicians reported that Brahmi capsule is effective in all of its indications. 63 physicians responded that it is giving positive result in three of its indications.



### 3) Indications of Brahmi capsule

#### Clinical Experience in years and Indications of Brahmi capsule

Table-6- Cross tabulation

		Indications of Brahmi capsule				Total
		Improving intelligence & concentration(I&C) and memory	Improving I&C ,memory and <b>sleep</b>	Improving I&C, memory and <b>speech</b>	All indications	
Clinical Experience in years	1-10 Years	16	15	20	15	66
	11-20 years	22	28	20	21	91
	21-30 years	10	12	14	5	41
	More than 30 years	6	8	5	3	22
Total		54	63	59	44	220

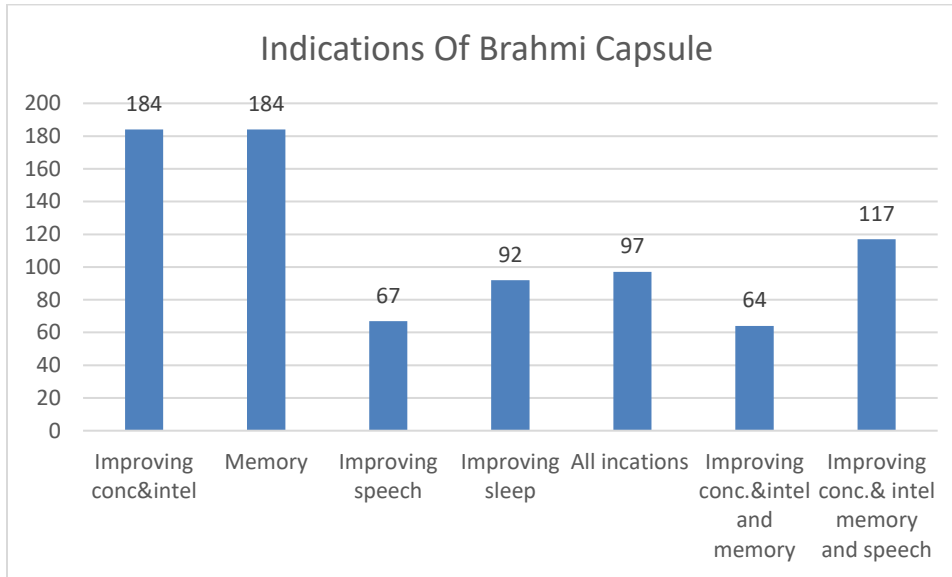
Out of 220 responses, 154 physicians with more than 10 years of experience opined that it is effective in majority of its indications. Out of 4 major indications, 176 physicians responded that it is effective in three of its indications.

Table-7-Indications of Brahmi capsule

Indications of Brahmi capsule	Observations
Improving concentration & intelligence	184
Memory	184
Improving speech	67
Improving sleep	92
All indications	97
Improving concentration & intelligence and memory	64

Improving concentration & intelligence, memory and speech	117
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**Figure-3-Clustered column-** Indications of Brahmi capsule

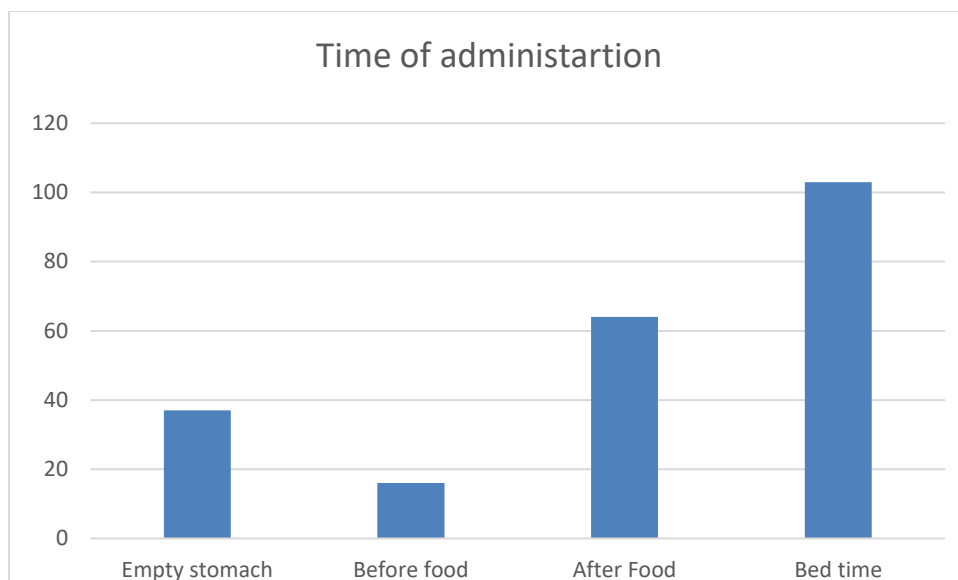


#### 4) Ideal time of administration of Brahmi Capsule

Table-8- Time of administration of Brahmi Capsule

Empty stomach	37
Before food	16
After Food	64
Bed time	103

Figure-4- Ideal time of administration of Brahmi Capsule



**Ideal time for administration of Brahmi Capsule and Indications of Brahmi capsule**  
**Table-9-Cross-tabulation**

Count

		Indications of Brahmi capsule				Total
		Improving I&C and memory	Improving I&C, memory and sleep,	Improving I&C ,memory and speech	All indications	
Ideal time for administration of Brahmi Capsule	Empty stomach	7	10	14	6	37
	Before food	3	6	3	4	16
	After Food	15	22	18	9	64
	Bed time	29	25	24	25	103
Total		54	63	59	44	220

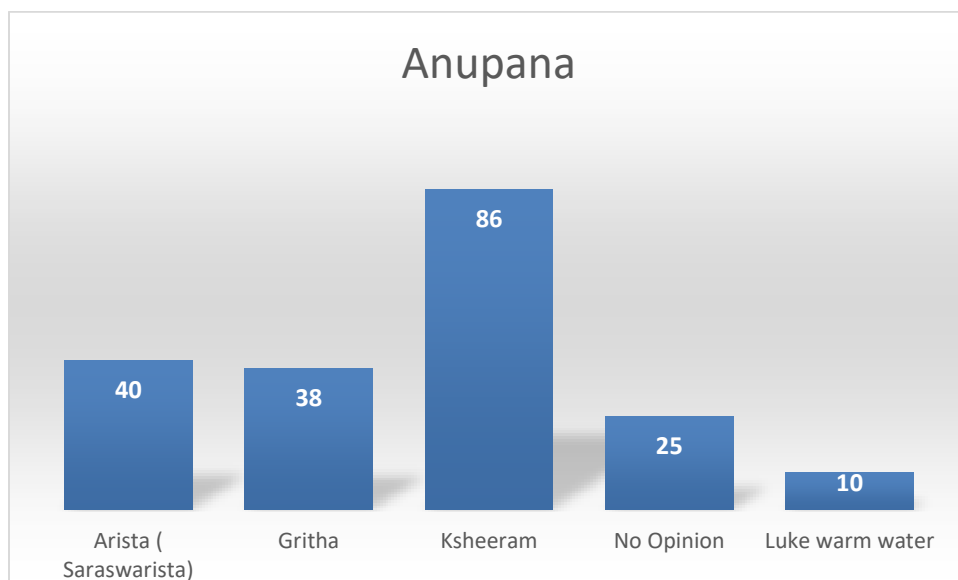
Cross tabulation shows that majority of the doctors (103-46.8%) opined that ideal time of administration of Brahmi capsule is at bed time. 64(30%) physicians reported that the ideal time of taking Brahmi capsule is after food.

## 5) Anupana

**Table-10-Common Anupana**

Arista ( Saraswarista)	40
Gritha	38
Ksheeram	86
No Opinion	25
Luke warm water	10

**Figure-5**



**Anupana and Indications of Brahmi capsule**

**Table-11- Cross-tabulation**

		Indications of Brahmi capsule				Total
		Improving I&C and memory	Improving I&C ,memory and sleep	Improving I&C ,memory and speech	All indications	
Anupana	Arishta	15	18	14	7	54
	Gritha	10	10	12	8	40
	Ksheeram	21	25	22	22	90
	No Opinion	8	5	7	6	26
	Luke warm water	0	5	4	1	10
Total		54	63	59	44	220

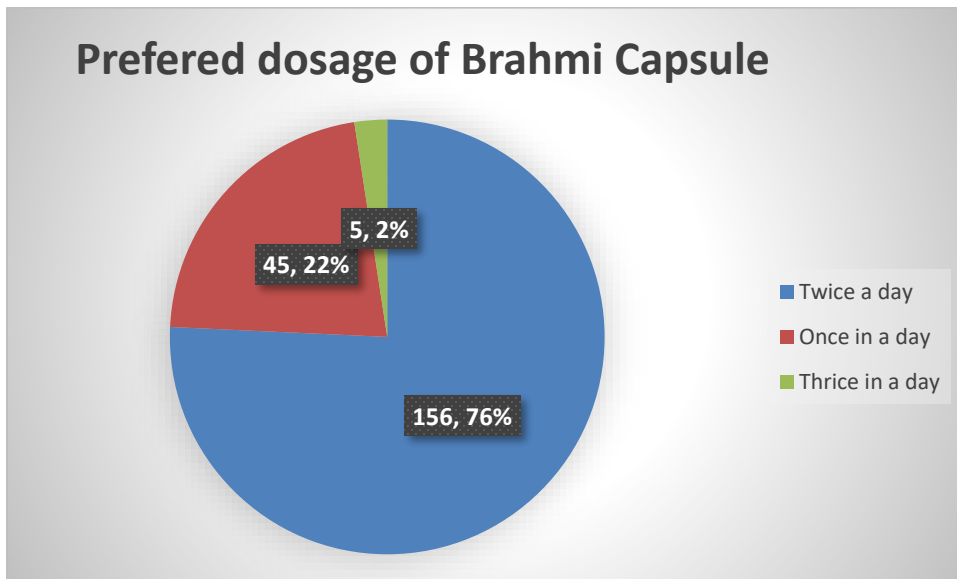
Majority of the physicians (90) suggested that the anupana of brahmi capsule is ksheeram. The combination with saraswaristam is also suggested by 54 physicians.

**6) Preferred dosage**

Table-12-Dosage

Preferred dosage	Frequency
Twice a day	156
Once in a day	45
Thrice in a day	5

**Figure-6**



Majority (76%) of the physicians’ ideal dosage of the medicine is twice a day.

**Preferred dosage of Brahmi capsule \* Indications of Brahmi capsule**

Table-13- Cross-tabulation

	Indications of Brahmi capsule				Total
	Improving I&C and memory	Improving I&C ,memory and sleep	Improving I&C ,memory and speech	All indications	

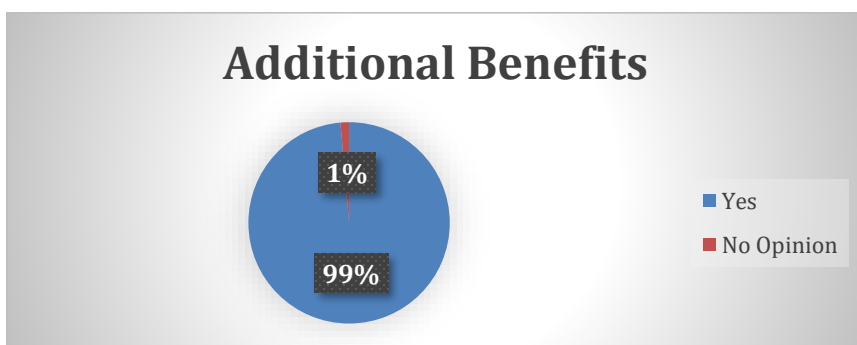
Preferred dosage of Brahmi capsule	Once in a day	9	18	15	9	51
	Twice a day	42	45	43	34	164
	Thrice a day	3	0	1	1	5
Total		54	63	59	44	220

## 7) Additional benefits

Table-14- Additional benefits

Additional benefits	Observations
Yes	216
No Opinion	4

Figure-7



99% of the respondents opined that Brahmi capsule is having additional benefits like relieving anxiety, stress etc.

## Additional Benefits and Effectiveness of Brahmi capsule

Table-15- Cross-tabulation

		Effectiveness of Brahmi capsule			Total
		Mild	Moderate	Very Effective	
Additional Benefits	Yes	12	84	120	216
	No Opinion	2	2	0	4
Total		14	86	120	220

**Table-15-Chi-Square Tests**

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.136 <sup>a</sup>	2	.047
N of Valid Cases	220		

The test for association of Effectiveness of Brahmi capsule and its additional benefits is found to be statistically significant with a p value 0.047.

Table-16- Additional Benefits and usage of Brahmi capsule in clinical practice

		Additional Benefits		Total
		Yes	No Opinion	
In your clinical practice are you using Brahmi capsule	Never	0	1	1
	Rarely	17	0	17
	Occasionally	103	0	103
	Always	97	2	99
Total		217	3	220

**Table-17-Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	74.310 <sup>a</sup>	3	.000
N of Valid Cases	220		

The test for association of additional observations and the physicians with almost always usage of brahmi capsule is found to be statistically significant with a p value 0.000.

**Additional observations-** It increases bowel movement in constipated patients. It is good in gastritis, premature graying of hair, excessive salivation or drooling of Saliva, stammering etc.

#### Section 4- Discussion

##### 1) Indications of Brahmi capsule

###### Improving concentration and intelligence.

Out of 220 responses, 184 physicians opined that brahmi capsule improves concentration and intelligence. Acharyas have mentioned that Medhya drugs are useful in the effective management

of many conditions related with mind and Brahmi (*Bacopa monnieri*) is a widely accepted Medhya drug. It is also included in the gana of Prajnasthapana (restoring intellect and knowledge), Samjya sthapana (Restoring sensation) and Shiro virechana. Therefore, Brahmi, may directly work on micro-faculties of such as Dhi, Dhriti, and Smriti which in turn will help in the management for treating behavioral issues and learning difficulties.

Bacopa, by the virtue of containing active constituents like bacosides, influences the synthesis and availability of the neurotransmitter, serotonin. Therefore, Bacopa helps to maintain neurotransmitter balance ([Charles et al., 2011](#); [Rauf et al., 2012a](#)). Bacoside A shows a potent antioxidant effect in specific areas of brain. Bacopa is known to increase the activity of endogenous antioxidant SOD (Super oxide dismutase) & GPX (glutathione peroxidase) in all the brain regions after a period of 21 days. Bacopa monnieri is also known to increase the antioxidant effect in hippocampus, a structure normally rich in memory neurotransmitter Acetyl choline. Bacopa has been found to reverse the drug induced depletion of Acetyl choline in the hippocampus.<sup>4</sup>

The bacosides promote the repair of damaged neurons by up regulating neuronal synthesis and kinase activity. The bacosides also aid in the restoration of synaptic activity, which ultimately leads to nerve impulse transmission ([Singh and Dhawan, 1997](#)). The nerve impulse transmission, plays a vital role in promoting healthy cognitive functions like attention span, focus, concentration, learning and memory.<sup>5</sup>

### **Effect on memory**

Bacopa monnieri has been studied extensively at the central drug research institute Lucknow. According to the works at CDRI, Bacosides are the main phytochemical responsible for its action. Bacosides are attributed with capability to enhance the efficiency of nerve transmission thereby it strengthens memory and cognition.<sup>6</sup>

According to Kayyadeva nighantu, brahmi is medhya (improves intellect), rasayana (general rejuvenator), hridya (improves general mood), ayushya (increases longevity)<sup>7</sup>.

Among all the free radicals in living organisms, the most abundant are the super oxide radical and most destructive are the hydroxyl radical. These radicals appear to work together to induce degeneration by oxidizing membrane lipids, breaking DNA strands and damaging cellular proteins. The enzymatic defense system operates as a chain, starting from SOD and followed by the action of GPX and CAT.



*Bacopa monnieri* is found to increase SOD, CAT & GPX activities significantly throughout all the brain regions. Thus it possesses possible anti-aging benefits owing to its ability to alleviate oxidative stress in the striatal area of brain, which has good benefit in Alzheimer's & Parkinson's disease.

Study revealed that standardized *Bacopa monnieri* extract produced significant improvement on mental control, logical memory and paired associated learning during the 12-week drug therapy.<sup>8</sup>

### **Improving speech**

67 doctors suggested that brahmi capsule is effective in improving speech (swarya). According to Bhava prakasha, Kayya deva nighandu<sup>7</sup> and Madanapala nighandu it is swarya.

### **Improving sleep**

92 physicians opined that brahmi capsule improves the quality of sleep. *Bacopa* is considered to mediate the Gamma- Amino Buteric (GAB) aergic system.<sup>8</sup> Gamma- Amino Buteric acid is an inhibitory neuro-transmitter that has been shown to possess sedative, anticonvulsive and anti-nociceptive effects.

Charaka has described the cause of sleep as due to the Klanta( fatigue) and Klama (mental fatigue) and the divorce of the sense objects from the senses.<sup>9</sup> Brahmi helps to lower stress and anxiety levels which in turn helps the mind to detach itself from the sense organs and thus leads to natural circadian rhythms which induce sound sleep.

### **Ideal time of administration of Brahmi Capsule**

For any medicine to show its complete action on the vyādhi(disease), it needs to be administered in a proper kāla(time) with regards to doṣa (Functional elements of body) predominance, agni bala (digestive power), bala of rogi(strength of the patient) etc. That particular time is termed as auśadha sevana kāla.ie, the ideal time for administration of medicine. Vāgbhaṭa has stated that 'kālo bheṣaja yogakṛt, which means, kāla (the ideal time) fulfils the aim of administration of auśadha (medicine). Most of the physicians responded that the ideal time of administration of Brahmi Capsule is at bed time as the indications of Brahmi capsule is mainly related to brain functions. 'Nīśi' (night time administration of a drug) is ideal for the treatment of diseases related to parts of the body above shoulders.<sup>10</sup>

### **Preferred Anupana**

Anupana is a substance which is taken along with or after the intake of Aahara (food) and oushadha drug<sup>11</sup>. Most popular anupana for Brahmi is milk. According to Vagbhata, milk when digested

properly, it is jivaniya (nourishes all the tissues), medhya (improves intelligence), sramahara (reduces fatigue). It is one of the most important foods to promote ojas (Essence of all physiological activities and health)<sup>12</sup>. So administration of Brahmi with milk enhances its therapeutic effectiveness.

### **Additional benefits of Brahmi**

Over and above the indications that has been mentioned, Brahmi is a well-known Rasayana dravya (regenerative drug), and Susruta mentions its usage in the Medha Ayushkamiya Adhayaya ,where it is mentioned that Brahmi helps in treating both Medha (intellect) and Ayus (Improves life expectancy) related problems. It implies that it acts at cellular levels, improving the innate healing potential and thus enhancing the life span by aging gracefully. Rasayana drugs like Brahmi have been shown to be antioxidants. Antioxidants play a definite role in improving the quality of life by preventing the excessive wear and tear phenomenon of cell structure and maintaining normal physiological activities.

Acharyas agree that Pragyaparadha( improper actions done physically, verbally and mentally which leads to long standing unhealthy issues) is the primary cause of the emergence of most of the diseases. So, if a person's Medha (intellect) is taken care of by regular usage of Brahmi, his/her positive decisions can help him in maintaining his/her personal and social life healthy on a long term basis. Kashyapa has recommended the use of Medhya Rasayana (substances that enhances a person's intellect) like Brahmi soon after the birth itself to promote normal brain functioning. All acharyas have recommended the use of medhya rasayanas like Brahmi to promote intellect and also for the treatment of Manasika vyadhi (mental disorder) like Unmada, Apasmara etc<sup>13</sup>

### **Conclusion**

- 1) Brahmi is a traditional medicine used since Vedic times for problems related to memory and cognition. This cross sectional study was conducted among the Ayurvede physicians across India to assess the effectiveness and additional benefits of Brahmi Capsule.
- 2) Out of 220 physicians, 155 (70.45%) physicians were having more than 10 years of experience, 63 physicians were having more than 20 years of experience. 202 physicians are using Brahmi capsule in their practice either always or occasionally.

- 3) 70.45%(155) of physicians having more than 10 years of experience suggested that Brahmi capsule is very effective in the management of memory dysfunction. It also helps in improving concentration, intelligence, speech and sleep.
- 4) Out of the 4 major indications that is mentioned, 176 physicians responded that it is effective in three of its indications like improving concentration & intelligence, memory and speech.
- 5) Majority of the doctors (103-46.8%) opined that the ideal time of administration of Brahmi capsule is at bed time.
- 6) 90 physicians suggested that the anupana of brahmi capsule is ksheeram. The combination with Saraswarishtam is also opined by 54 physicians.
- 7) 216 physicians opined that Brahmi shows additional benefits like relieving anxiety, tremors, depression related to diabetes and helps to improve fine movements of upper and lower limbs in post-surgical cases. It also shows positive results in conditions like stress, disturbed sleep, seizures, slurred speech, stammering and premature graying of hair .
- 8) It is evident from the literature that our Acharyas were having a clear idea about the usage of Brahmi as Medhya rasayana and it was given to infants soon after birth considering its potency to facilitate proper nutrition to both body and mind.
- 9) Brahmi is a well-known Rasayana dravya, and Sushruta mentions its use in the Medhaayushkamiya adhayaya for both treating intellect and for improving the life expectancy. It implies that Brahmi acts at cellular levels, improving the innate healing potential and thus enhances the quality of life by aging gracefully.
- 10) All the Acharyas agree that Pragyaparadha is the primary cause of the emergence of all diseases and to prevent it, proper functioning of Medha(intellect) is a must. Medicines like Brahmi helps an individual in improving the mental functions including intellect and thus helps in carrying out a productive healthy personal and social life.
- 11) Statistically significant values (P value <0.05) has been obtained in the survey

- a) The test for association of Effectiveness of Brahmi capsule and Clinical Experience in years got significant association with a P value 0.007(<.05).
- b) The test for association of Effectiveness of Brahmi capsule and its additional benefits is found to be statistically significant with a p value 0.047.
- c) The test for ‘association of additional observations’ and the ‘physicians with almost always usage of brahmi capsule’ is found to be statistically significant with a p value 0.000.

### **Future work recommendation**

A comparative clinical trial for assessing the effectiveness and added benefits of Brahmi capsule.

### **Acknowledgement**

Managing Trustee, Arya Vaidya Sala Kottakkal, Chief Executive officer Arya Vaidya sala, Kottakkal, and the whole physicians who involved in the survey

### **Conflict of Interest**

None

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