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Review Article

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"MEDHYA RASAYANA AND HUMAN COGNITION: A CRITICAL REVIEW OF CLINICAL EVIDENCE FOR CHARAKA'S FOUR MEDHYA DRUGS AND RELATED PLANTS, WITH ATTENTION TO BOTANICAL IDENTITY"

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ABSTRACT
Medhya rasayana are Ayurvedic drugs believed to promote intellect (medha), memory and other mental faculties. Charaka specifies four: the juice of Mandukaparni, powdered Yashtimadhu with milk, the juice of Guduchi, and a paste of Shankhapushpi. This review appraises the human clinical evidence for these four drugs and for two closely related plants, Brahmi and Ashwagandha, and examines how uncertainty about botanical identity affects interpretation. The best evidence concerns *Bacopa monnieri*. A meta-analysis of nine randomised trials found shorter Trail B and choice reaction times, and a systematic review of six 12-week trials found improvement in memory free recall but little effect in other domains. Classical scholarship, however, has argued that Brahmi and Mandukaparni are synonyms for *Centella asiatica*, and that *Bacopa monnieri* corresponds to a different classical plant, Aindri. For *Centella asiatica*, a meta-analysis of eleven trials found no significant benefit in any cognitive domain, only improved alertness and reduced anger. A placebo-controlled trial of Ashwagandha root extract in 50 adults with mild cognitive impairment reported better memory and executive function after eight weeks. For Yashtimadhu, Guduchi and Shankhapushpi, we found no randomised placebo-controlled trials of cognitive outcomes; Shankhapushpi has only open-label studies, and its name is applied to more than one plant. Most trials used standardised extracts rather than classical preparations, enrolled healthy volunteers, and lasted at most 12 weeks. We propose priorities for trials that test classical medhya preparations in defined populations, with authenticated plant material.

KEYWORDS: Medhya rasayana, cognition, memory, *Bacopa monnieri*, *Centella asiatica*, Brahmi, Mandukaparni, Ashwagandha, Dravyaguna

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INTRODUCTION

Ayurveda recognises a group of rasayana drugs that act particularly on the mind, called medhya rasayana. Medha is usually translated as intellect, but classical texts describe a cluster of mental faculties, including dhi (understanding), dhriti (retention or restraint) and smriti (memory), whose impairment underlies many disorders.[1] In the chapter on rasayana, Charaka names four drugs as medhya: the juice of Mandukaparni, the powder of Yashtimadhu taken with milk, the juice of Guduchi with its root and flower, and a paste of Shankhapushpi.[1] Of these, Shankhapushpi is singled out as the most medhya.[1]

Interest in these drugs has grown with the global burden of dementia and with the commercial market for cognitive supplements. Much of this interest has focused on Brahmi, which is widely marketed as *Bacopa monnieri*, and on Ashwagandha. Translating classical claims into modern evidence is complicated by two problems: uncertainty about which plants the classical names denote, and differences between classical preparations and the extracts used in trials. This review appraises the human clinical evidence for the four medhya rasayana of Charaka and for Brahmi and Ashwagandha, and considers how identity and preparation affect interpretation.

METHODS

This is a critical narrative review. We searched PubMed, open-access repositories and publisher websites for systematic reviews, meta-analyses and randomised trials of the six drugs reporting cognitive outcomes in humans, and for scholarship on their botanical identity. Where no randomised trial was found, we report the best available human evidence.

THE IDENTITY PROBLEM: BRAHMI, MANDUKAPARNI AND AINDRI

The most important issue for interpreting the evidence is the identity of Brahmi. In modern commerce and research, Brahmi usually means *Bacopa monnieri*, and Mandukaparni means *Centella asiatica*. A detailed historical analysis by Singh argued that the classical texts use three names – Brahmi, Mandukaparni and Aindri – and that Brahmi and Mandukaparni never occur together in the Brihattrayi, are treated as one plant by the commentator Dalhana and by the Nighantus, and are therefore synonyms for *Centella asiatica*; Brahmi names the plant by its action and Mandukaparni by its leaf shape.[2] Aindri, which does appear alongside Brahmi, was identified as a separate plant corresponding to *Bacopa monnieri*.[2] On this reading, the Mandukaparni of Charaka's medhya list is *Centella asiatica*, and the large body of research on *Bacopa monnieri* concerns a related classical drug rather than the one named.

The confusion persists in trade. A 2025 bulletin of the Botanical Adulterants Prevention Program noted that the two plants share the name Brahmi in some languages, are frequently mislabelled, and differ in their constituents and pharmacological effects, although both are used for cognition.[3] Shankhapushpi presents a similar problem: the name is applied to *Convolvulus pluricaulis* and to several other plants in different regions, so a study of Shankhapushpi cannot be interpreted without knowing which species was used. Table 1 summarises the identities assumed in this review.

Table 1. Classical medhya drugs, usual botanical identities and identity issues.

Classical name	Usual identity in research	Identity issue
Mandukaparni	*Centella asiatica*	Regarded by some scholars as a synonym of Brahmi[2]
Brahmi	*Bacopa monnieri* in commerce	Classical Brahmi may be *Centella asiatica*; *Bacopa* may correspond to Aindri;[2] frequent mislabelling in trade[3]
Yashtimadhu	*Glycyrrhiza glabra*	Root; generally undisputed
Guduchi	*Tinospora cordifolia*	Substitution with other *Tinospora* species occurs
Shankhapushpi	*Convolvulus pluricaulis*	Name applied to several plants in different regions
Ashwagandha	*Withania somnifera*	Root; leaf-containing extracts also marketed

Table 2. Human evidence for cognitive effects of medhya drugs.

Drug	Best evidence	Main findings	Limitations
Bacopa monnieri	Meta-analysis of 9 RCTs, 437 analysed;[4] systematic review of 6 RCTs[5]	Trail B time shortened by 17.9 ms; choice reaction time shorter; free recall improved in 9 of 17 tests; little effect in other domains	Standardised extracts 300–450 mg/day; 12 weeks; mostly healthy adults
Centella asiatica (Mandukaparni)	Meta-analysis of 11 RCTs[6]	No significant effect in any cognitive domain; improved alertness and reduced anger	6 of 11 trials used combinations; mostly healthy volunteers; doses varied
Ashwagandha	RCT, 50 adults with mild cognitive impairment[7]	Better immediate and general memory, executive function and attention vs placebo after 8 weeks	Single small trial; commercial extract; short
Shankhapushpi	Open trials[8,9]	Memory measures improved vs yoga comparator; children improved with a multi-herb formula	No placebo control; multi-herb product in one study

Bacopa monnieri

A systematic review of six randomised, placebo-controlled trials in adults without dementia, each lasting 12 weeks and using 300–450 mg/day of one of three extracts, found improvement in 9 of 17 tests of memory free recall but little evidence of benefit in other cognitive domains.[5] A meta-analysis of nine trials with 437 analysable participants found that Bacopa shortened Trail B time by 17.9 ms and choice reaction time, and the authors concluded that it may improve cognition, particularly speed of attention, while calling for a large head-to-head trial with a standardised preparation.[4] These are modest effects of uncertain clinical importance in healthy people, and no trial has shown benefit in dementia.

Centella asiatica (Mandukaparni)

A meta-analysis of eleven randomised trials, five of *C. asiatica* alone and six of combination products, found no significant improvement in any cognitive domain compared with placebo, including overall cognitive status and verbal and visual memory.[6] It did find improved self-reported alertness and reduced anger. The authors concluded that there is no strong evidence for cognitive benefit, while noting problems of dose, preparation and standardisation.[6] Charaka specifies the fresh juice (svarasa) of Mandukaparni,[1] whereas most trials used dried extracts, so the classical preparation has not been tested.

Shankhapushpi, Yashtimadhu and Guduchi

For Shankhapushpi, the only human cognitive studies we found were open-label. In 102 healthy young volunteers, Shankhapushpi tablets for two months were associated with improved long-term memory measures compared with a yoga intervention,[8] and in schoolchildren a multi-herb medhya formulation improved short-term memory.[9] Neither study had a placebo group, and the second cannot attribute effects to Shankhapushpi. We found no randomised placebo-controlled trial of cognitive outcomes for Yashtimadhu or Guduchi. Classical preparations of these two drugs – the powder with milk and the fresh juice – have therefore not been evaluated for the indication Charaka gives.

Ashwagandha

Ashwagandha is not among Charaka's four medhya drugs but is widely used for mental fatigue, stress and sleep. In a double-blind trial in 50 adults with mild cognitive impairment, 600 mg/day of a commercial root extract for eight weeks improved immediate and general memory, executive function, attention and information-processing speed compared with placebo.[7] The extract was supplied by its manufacturer, and the trial was small and short.

SAFETY

The drugs reviewed are generally well tolerated in short trials. Yashtimadhu taken in large doses for long periods can cause pseudo-aldosteronism with hypertension and hypokalaemia, which is relevant to older adults, the main population at risk of cognitive decline. Guduchi and Ashwagandha have both been associated with rare idiosyncratic liver injury, particularly in people with pre-existing liver disease.[10,11] Long-term use for cognitive protection

should therefore be supervised.

APPRAISAL AND DRAVYAGUNA PERSPECTIVE

Three gaps separate the classical claim from the modern evidence. First, the plant most studied (*Bacopa monnieri*) may not be the plant Charaka named, while the plant he probably did name (*Centella asiatica*) has shown no clear cognitive benefit in trials of dried extracts.[2,6] Second, three of the four classical medhya drugs have no randomised cognitive trials at all. Third, classical preparations – fresh juices, powder with milk, a paste – differ from the standardised capsules tested, and their chemical composition has rarely been characterised.[12]

Classical texts also present medhya rasayana within a broader regimen that includes conduct (achara rasayana), diet and, for rasayana proper, prior purification, and they describe its benefits over long periods.[1] Twelve-week trials of an isolated extract in healthy adults test only a narrow part of this claim. On the other hand, the classical framework does generate testable predictions. If medhya drugs differ in action – Shankhapushpi being described as the most potent – head-to-head trials could test the ranking. If the fresh juice of Mandukaparni is the intended form, it can be compared directly with a dried extract.

RESEARCH PRIORITIES

- Authenticate plant material by morphology, chemistry or DNA and report the species, part and preparation in every trial.[12]
- Conduct randomised placebo-controlled trials of Yashtimadhu, Guduchi and Shankhapushpi, ideally in their classical forms.
- Compare *Centella asiatica* and *Bacopa monnieri* directly, as historical scholarship recommends.[2]
- Study populations at risk, such as older adults with subjective or mild cognitive impairment, over at least six to twelve months.
- Use validated, pre-specified cognitive batteries with a defined primary outcome and report clinically meaningful differences.
- Monitor safety, including blood pressure and potassium with Yashtimadhu and liver tests with Guduchi and Ashwagandha.

LIMITATIONS

This is a narrative review and may have missed trials in regional journals or theses. The identity of classical plants remains a matter of scholarly debate, and we have presented one well-argued position rather than resolving it. Several key studies could be summarised only from their abstracts.

CONCLUSION

The modern evidence for medhya rasayana is thinner and more indirect than the popularity of these drugs suggests. *Bacopa monnieri* has modest benefits on attention and recall in healthy adults, and Ashwagandha has a single small positive trial in mild cognitive impairment. *Centella asiatica*, which may be the classical Mandukaparni and Brahmi, has not shown clear cognitive benefit, and the other three medhya drugs named by Charaka have not been tested in controlled cognitive trials. Clarifying botanical identity, testing classical preparations and studying people at risk of decline are the steps needed before classical claims about medhya rasayana can be confirmed or refuted.

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