

Review Article

Volume 15 Issue 07

July 2026

SMRITI (MEMORY) IN AYURVEDA: A CONCEPTUAL REVIEW OF CLASSICAL PERSPECTIVES AND CONTEMPORARY CORRELATIONS

***Dr. Anusree V.V¹, Dr. Preeti Gavali², Dr. Sani Lalsing Kokani³, Dr. Diksha Bhardwaj⁴,
Dr. Krishan Kumar Jat⁵**

^{1,3,4,5}PG Scholar, Department of Rog Nidana Evam Vikriti Vigyana, National Institute of Ayurveda, Jaipur, Rajasthan, India.

²Assistant Professor, Department of Rog Nidana Evam Vikriti Vigyana, National Institute of Ayurveda, Jaipur, Rajasthan, India.

***Corresponding Author:** Dr. Anusree V.V, PG Scholar, Department of Rog Nidana Evam Vikriti Vigyana, National Institute of Ayurveda, Jaipur, Rajasthan, India

Email: anusreev19@gmail.com, Mobile: 9061675454

ABSTRACT

Smriti (memory) is one of the fundamental cognitive faculties described in *Ayurveda* and constitutes an essential component of *Prajna* (wisdom), along with *Dhi* (intellect) and *Dhriti* (retention and control). Classical Ayurvedic literature presents *Smriti* not merely as a psychological function but as a multidimensional phenomenon arising from the harmonious interaction of *Atma* (self), *Manas* (mind), *Indriya* (sense organs), *Buddhi* (intellect), and various physiological factors. The process of memory formation and retrieval is influenced by *Dosha*, *Guna*, *Prakriti*, *Sara*, *Vaya*, dietary habits (*Ahara*), lifestyle (*Vihara*), and psychological status. Disturbances in these factors may lead to *Smriti Vibhramsha*, a condition characterized by impairment or distortion of memory. Modern neuroscience defines memory as the capacity to encode, store, and retrieve information. Although the terminology and conceptual frameworks differ, several parallels can be observed between Ayurvedic descriptions of *Smriti* and contemporary theories of cognition and memory processing. The present review critically examines the concept of *Smriti* as described in classical Ayurvedic

texts and contemporary literature. It explores its philosophical foundations, physiological basis, influencing factors, pathological alterations, and therapeutic implications. Additionally, an attempt has been made to correlate Ayurvedic concepts with modern understandings of memory and cognitive function.

Keywords:

Smriti, Memory, *Buddhi*, *Medha*, *Prajna*, *Smriti Vibhramsha*, Cognitive Function, *Medhya Rasayana*

1. INTRODUCTION

Memory is one of the most sophisticated and indispensable cognitive functions that enables human beings to learn, adapt, and interact with their surroundings. In modern neuroscience, memory is commonly defined as the process through which information is encoded, stored, consolidated, and subsequently retrieved when required. These processes involve complex neural networks distributed across multiple brain regions, particularly the hippocampus, amygdala, and cerebral cortex.

Ayurveda provides a holistic understanding of cognitive functions through the interconnected concepts of *Manas*, *Buddhi*, *Medha*, *Dhi*, *Dhriti*, and *Smriti*. Among these, *Smriti* represents the faculty responsible for recollection and remembrance of previously acquired knowledge and experiences. Consequently, memory is regarded not merely as a cognitive process but as a manifestation of harmonious physical, mental, and spiritual functioning. Classical literature repeatedly emphasize that proper memory is essential for maintaining health and avoiding intellectual errors (*Prajnaparadha*). Also, it is mentioned by Acharya Charaka that the power of metaphysical memory constitutes the best way for salvation (*Moksha*).⁽¹⁾

Several determinants influence memory, including *Dosha* balance, *Prakriti*, *Sara*, *Vaya*, dietary practices, mental discipline, and spiritual conduct. Therapeutic interventions have been advocated for preserving and enhancing cognitive faculties, particularly through *Rasayana* therapy, *Medhya Rasayana* and medicated *Ghritas*. In recent decades, increasing scientific interest in cognition, neurodegeneration, and healthy aging has renewed attention toward traditional concepts related to memory and cognitive enhancement.

2. MATERIALS AND METHODS

Classical Ayurvedic texts including Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, and their commentaries were reviewed. Relevant articles were searched from PubMed, Google Scholar, Scopus, and other electronic databases using keywords such as "*Smriti*", "Memory", and "Cognitive Function".

3. LITERATURE REVIEW

3.1 CONCEPTUAL UNDERSTANDING OF *SMRITI*

The Sanskrit term *Smriti* is derived from the verbal root "*Smri*" meaning "to remember," "to recollect," or "to bring to consciousness." Ayurvedic understanding of *Smriti* encompasses a broader spectrum of mental functions involving retention, recollection, recognition, and application of previously acquired knowledge.

Various classical texts and philosophical schools have defined *Smriti* from distinct perspectives. Acharya Charaka defines *Smriti* as the remembrance of things directly perceived, heard from scriptures or experienced earlier.⁽²⁾ Chakrapani interprets *Smriti* as the knowledge about objects and experiences of past.⁽³⁾ Sushruta similarly considers memory as the remembrance of previously experienced objects and events.⁽⁴⁾ The *Vaisheshika* school describes *Smriti* as the manifestation of latent impressions generated through the interaction of the self and the mind.⁽⁵⁾ Yoga vasishta regards memory as the re-emergence of experiences that have previously been perceived.⁽⁶⁾ *Shabdakalpadruma* explains *Smriti* as the recollection of previously experienced objects, persons, or events, often accompanied by emotional and psychological responses.⁽⁷⁾ In *Tarka sangraha*, *Smriti* is mentioned as remembering previous experiences.⁽⁸⁾ These definitions collectively indicate that *Smriti* is not merely the storage of information but rather the dynamic process of recalling previously acquired knowledge in an accurate and meaningful manner.

3.2 *SMRITI* AS A COMPONENT OF *PRAJNA*

Ayurvedic literature describes *Prajna* (wisdom or higher intelligence) as comprising three fundamental faculties: *Dhi*, *Dhriti* and *Smriti*.⁽⁹⁾ These three faculties function in a coordinated manner to produce appropriate cognition and behaviour.

Dhi refers to the capacity for perception, understanding, discrimination, and acquisition of knowledge. It allows an individual to comprehend sensory information and distinguish between beneficial and harmful experiences. ⁽¹⁰⁾ *Dhriti* represents the faculty of retention, restraint, and regulation. It enables the mind to maintain stability, preserve acquired knowledge, and exercise control over sensory and emotional impulses. ⁽¹¹⁾ *Smriti* is the faculty of recollection. It retrieves previously stored experiences and makes them available for present cognitive processing. In short memory contains everything memorable. ⁽¹²⁾

Together, *Dhi*, *Dhriti*, and *Smriti* constitute the foundation of intelligent behavior. Impairment of any one component adversely affects the others, leading to defective judgment and inappropriate actions. This disturbance is often referred to as *Prajnaparadha* (intellectual blasphemy), which is considered one of the principal causes of disease in Ayurveda. ⁽¹³⁾

3.3 RELATIONSHIP BETWEEN *BUDDHI*, *MEDHA*, AND *SMRITI*

The concepts of *Buddhi*, *Medha*, and *Smriti* are closely interrelated and collectively contribute to cognitive functioning. Although these terms are often used together, they represent distinct aspects of mental activity. *Buddhi* primarily denotes the faculty of discrimination, analysis, reasoning, and decision-making. It enables interpretation of sensory information and formation of meaningful knowledge. ⁽¹⁴⁾ *Medha* refers to the capacity for grasping, retaining, organizing, and integrating knowledge. It facilitates learning and long-term preservation of information. ⁽¹⁵⁾ *Smriti* represents the ability to recollect stored information when required. ⁽¹⁶⁾

The process of cognition may be understood in the following sequence:

1. Perception and understanding through *Buddhi*.
2. Retention and consolidation through *Medha*.
3. Retrieval and recollection through *Smriti*.

Thus, memory cannot function independently of *Buddhi* and *Medha*. Proper recollection requires accurate perception and effective retention. Similarly, retention becomes meaningless if information cannot be retrieved when necessary. Therefore, these faculties operate as interconnected components of a unified cognitive system.

3.4 ROLE OF *ATMA*, *MANAS*, *INDRIYA* AND *BUDDHI* IN *SMRITI*

Ayurveda considers memory to be a multidimensional cognitive phenomenon resulting from the harmonious interaction of *Atma* (self), *Manas* (mind), *Indriya* (sense organs), and *Buddhi* (intellect). *Atma* is regarded as the substratum of consciousness and the ultimate witness of all experiences. Although cognitive functions are executed through *Manas*, *Buddhi*, and *Indriyas*, the presence of *Atma* is considered indispensable for perception, cognition, and recollection.⁽¹⁷⁾ Without the conscious principle, mental faculties remain incapable of functioning.⁽¹⁸⁾ *Manas* serves as the intermediary between the sense organs and intellect. It receives sensory impressions, directs attention toward specific stimuli, and facilitates their processing. The *Indriyas* constitute the gateways through which sensory information enters the cognitive system.⁽¹⁹⁾ Accurate perception is the first prerequisite for proper memory formation. Defects in sensory perception result in incomplete or distorted encoding of information, thereby affecting subsequent recollection. Thus, memory begins with proper interaction between sense organs and their respective objects.⁽²⁰⁾ *Buddhi* transforms sensory impressions into meaningful knowledge and facilitates their retention for future use.

3.5 PHILOSOPHICAL DIMENSIONS OF *SMRITI*

The Ayurvedic understanding of memory is deeply rooted in Indian philosophical traditions. The Bhagavad Gita provides one of the most profound psychological descriptions of memory. It explains that attachment gives rise to desire, desire leads to anger, anger produces delusion, and delusion ultimately destroys memory. Loss of memory then impairs intellect and results in personal downfall.⁽²¹⁾ This sequence demonstrates the crucial role of *Smriti* in maintaining emotional stability and rational judgment. From a philosophical perspective, therefore, *Smriti* serves as a bridge connecting past experiences with present cognition and future actions.

In *Shad Garbhakara bhavas*, Charaka identifies *Smriti* among the *Atmaja Bhavas*, qualities that originate from the self and manifest through the living individual.⁽²²⁾ This classification suggests that memory is intimately connected with consciousness and cannot be fully explained solely through material mechanisms. Also miraculous memory is considered as one among the eight supernatural powers (*Ashtaishwarya sidhi*).⁽²³⁾ *Smriti* is also considered as a proof of the existence of soul⁽²⁴⁾ and as a feature of *paramatma*.⁽²⁵⁾

3.6 PHYSIOLOGY OF *SMRITI*

Although the classical texts do not describe memory formation as a single unified process, various scattered references collectively provide a detailed framework for understanding the genesis and functioning of *Smriti*.

3.6.1 *Smriti Utpatti Karana* (Factors Responsible for Memory Formation)

The process of memory formation is influenced by both intrinsic and extrinsic factors.

3.6.1.1 *Abhyantara Karana* (Intrinsic Factors)

According to Charaka, the interaction among *Atma* (self), *Manas* (mind), *Indriya* (sense organs), and *Indriyarthas* (objects of senses) constitutes the fundamental basis for cognition and memory formation. Proper functioning and coordination of these components are essential for perception, retention, and recollection. *Atma* acts as the conscious observer and experiencer. *Manas* receives sensory inputs and facilitates their processing. *Indriyas* gather information from the external environment, while *Indriyarthas* serve as the objects of perception. Any disruption in this chain may adversely affect memory functions.

3.6.1.2 *Bahya Karana* (Extrinsic Factors)

Charaka describes *Ashta smriti karana's* that facilitate the development and strengthening of memory. ⁽²⁶⁾

1. *Nimitta Grahana* – remembering through causal association.
2. *Rupa Grahana* – remembering through similarity of form.
3. *Sadrushya* – recollection through resemblance.
4. *Saviparyaya* – memory evoked by contrast.
5. *Satvanubandha* – memory strengthened by attention and concentration.
6. *Abhyasa* – repeated practice and repetition.
7. *Jnana Yoga* – acquisition of higher knowledge.
8. *Punah Shruta* – repeated hearing and revision.

These factors closely resemble modern cognitive principles such as association, repetition, attention, reinforcement, and retrieval cues that facilitate memory consolidation.

3.6.2 Mechanism of *Smriti* Formation

Ayurvedic literature suggests that memory formation occurs through a sequential process involving perception, analysis, retention, and recollection. The process begins when sensory organs perceive an object or event. The information is transmitted to *Manas*, which performs preliminary cognitive functions such as *Chintana* (thinking), *Vichara* (analysis), and *Uhya* (reasoning). Thereafter, *Buddhi* evaluates and determines the nature of the perceived information. Once knowledge is comprehended by the conscious self (*Atma*), it is retained through *Medha*. Subsequent exposure to similar stimuli facilitates retrieval of the stored information, manifesting as *Smriti*.⁽²⁷⁾ This conceptual framework remarkably parallels contemporary models of memory involving sensory registration, encoding, storage, and retrieval.

Therefore, the process of memory formation may be summarized as follows:

Indriya perception → *Manas* processing → *Buddhi* discrimination → *Medha* retention → *Smriti* recollection.

3.6.3 *Doshas* Involved in *Smriti* formation

Prana Vata is primarily responsible for the regulation of sensory perception and mental activities.⁽²⁸⁾ *Udana Vata* contributes to memory retrieval and expression.⁽²⁹⁾ *Vyana Vata* supports mental stability and coordination.⁽³⁰⁾ *Sadhaka Pitta* governs higher intellectual functions such as understanding, discrimination, and learning ⁽³¹⁾, whereas *Tarpaka Kapha* nourishes the nervous system and supports retention of information.⁽³²⁾ The balanced functioning of these *Doshas* is therefore essential for optimal memory performance.

3.7 DETERMINANTS OF *SMRITI*

The efficiency of memory is not uniform among individuals. Ayurveda recognizes several constitutional and physiological factors that influence memory capacity and cognitive performance.

3.7.1 Influence of *Prakriti*

The cognitive characteristics of an individual vary according to constitutional predominance of *Doshas*.

Table 1. Characteristics of *Smriti* According to *Prakriti*⁽³³⁾

<i>Prakriti</i>	Memory Characteristics
<i>Vata Prakriti</i>	<i>Alpa smriti, Chala Smriti, Sheeghra vismarana</i>
<i>Pitta Prakriti</i>	<i>Medhavi</i>
<i>Kapha Prakriti</i>	<i>Chiragrahi, Smrutimana</i>
<i>Satvika Prakriti</i>	<i>Smrutimana</i>

Individuals with *Vata* predominance often exhibit rapid acquisition of information but relatively poor retention. *Pitta*-dominant individuals generally possess strong intellectual abilities and analytical skills. *Kapha*-dominant individuals may learn slowly but demonstrate excellent long-term retention. *Satvika* personalities are characterized by superior memory and cognitive stability. *Yamya satwa* and *Brahma satwa* are also endowed with good memory.

⁽³⁴⁾

3.7.2 Influence of *Sara*

Among the eight *Sara* described in Ayurveda, certain constitutions are particularly associated with superior memory and intellectual capabilities. *Satva Sara* individuals possess excellent memory, emotional stability, courage, self-control, and cognitive efficiency. ⁽³⁵⁾ *Twak Sara* individuals possess good intellect and refined perceptive abilities. ⁽³⁶⁾

3.7.2 Influence of Age (*Vaya*)

Memory performance undergoes significant changes throughout life. During childhood (*Bala Avastha*), memory functions remain immature because of incomplete development of bodily tissues and sensory faculties. During middle age (*Madhya Avastha*), cognitive functions attain maximum efficiency owing to optimal physiological maturity. In old age (*Jara Avastha*), progressive degeneration of tissues and predominance of *Vata Dosha* contribute to decline in memory, retention, and recall abilities.⁽³⁷⁾ The age-related decline in memory described in Ayurveda closely resembles contemporary concepts of cognitive aging and age-associated memory impairment.

3.8 FACTORS INFLUENCING *SMRITI*

The efficiency of *Smriti* depends upon the integrity of cognitive mechanisms involving *Atma*, *Manas*, *Buddhi*, *Indriya*, *Doshas*, and *Gunas*. Any factor that enhances the harmonious

functioning of these components promotes memory, whereas disturbances lead to cognitive impairment and memory dysfunction. Several factors are described in Ayurvedic literature as beneficial for memory enhancement and preservation:

3.8.1 Satva Guna Dominance: The predominance of *Satva Guna* promotes clarity of perception, intellectual stability, concentration, and emotional balance. Individuals possessing *Satvika* mental constitution possess knowledge, intellect, retentive faculty of mind, memory and good restraint⁽³⁸⁾ demonstrating superior learning ability, retention, and recollection compared to those dominated by *Raja* or *Tama Gunas*. *Satwanubandha* has been mentioned as one among the cause of good memory.

3.8.2 Proper Diet and Lifestyle: *Satvika ahara* ⁽³⁹⁾, adequate sleep, regular exercise, meditation, and balanced sensory activities support healthy cognitive functioning. Ghee, milk, and wholesome dietary regimens described in Ayurveda are believed to nourish the nervous system and promote memory. ⁽⁴⁰⁾⁽⁴¹⁾

- Adequate sleep (*Nidra*)
- Regular Yoga practice
- Meditation
- Intellectual discussions (*Tadvidya Sambhasha*)⁽⁴²⁾
- Association with knowledgeable persons ⁽⁴³⁾
- Continuous learning and repetition (*Abhyasa*)

3.8.3 Spiritual Practices: Study of scriptures, meditation, Yoga, mindfulness, and contemplation are considered important methods for strengthening concentration and recollection. Classical texts also associate memory enhancement with spiritual discipline and mental purification. The pathogenic factors of mind can be reconciled through spiritual and sculptural knowledge, patience, through proper memory and meditation.⁽⁴⁴⁾

Various internal and external factors may adversely affect memory and cognitive functions.

- **Dosha Vitiation:** Vitiating of *Prana Vata*, *Udana Vata*, *Sadhaka Pitta*, and *Tarpaka Kapha* disrupts normal cognitive functioning. Such disturbances interfere with perception, retention, and recollection processes, resulting in memory impairment.

- **Psychological Stress:** Excessive anxiety, fear, grief, anger, frustration, and emotional trauma disturb mental equilibrium and impair cognitive performance. Chronic stress adversely affects concentration, learning, and memory retrieval. ⁽⁴⁵⁾
- **Improper Sensory Utilization:** Ayurveda identifies misuse, overuse, and underuse of sensory faculties (*Asatmya Indriyarthā Samyoga*) as important causes of mental dysfunction. Excessive sensory stimulation and unhealthy environmental exposures negatively influence memory processes. ⁽⁴⁶⁾
- **Sleep Disturbances:** Adequate sleep is essential for mental restoration and consolidation of memories. Insufficient or disturbed sleep weakens attention, learning capacity, and recollection abilities. ⁽⁴⁷⁾
- **Aging:** Progressive predominance of *Vata* during old age (*Jaravastha*) contributes to degeneration of tissues and cognitive decline. Age-related reduction in memory and intellectual performance is recognized in both Ayurveda and modern medicine.

3.9 ASSESSMENT OF *SMRITI*

Unlike contemporary neuropsychological assessment tools, Ayurveda primarily evaluates memory through clinical observation and inference (*Anumana pramana*). Charaka describes the examination of memory through "*Smritim Smaranena*,"⁽⁴⁸⁾ implying that memory should be assessed by evaluating the capacity for recollection. Traditionally, students and scholars were often assessed by their ability to recite Vedic hymns, *Shlokas*, and scriptural texts from memory. Such methods reflected the practical importance of memory in preserving and transmitting knowledge across generations.

3.10 AYURVEDIC PERSPECTIVE ON COGNITIVE DECLINE

Ayurveda recognizes progressive deterioration of cognitive faculties as a consequence of aging, chronic disease, nutritional deficiencies, psychological disturbances, and *Dosha* imbalance. Cognitive decline is often accompanied by weakening of *Medha*, impairment of *Buddhi*, reduction of *Satva*, and disturbance of memory functions. The classical description of age-related memory deterioration bears notable resemblance to contemporary concepts of mild cognitive impairment and age-associated cognitive decline. However, Ayurveda

adopts a broader perspective by incorporating constitutional, psychological, spiritual, and lifestyle determinants into the understanding of cognitive health.

3.11 PRAJNAPARADHA AND MEMORY DYSFUNCTION

Among the three principal causes of disease described in Ayurveda, *Prajnaparadha* (intellectual blasphemy) occupies a central position. ⁽⁴⁹⁾ *Prajnaparadha* refers to the failure of *Dhi*, *Dhriti*, and *Smriti*, leading an individual to engage knowingly in inappropriate actions.⁽⁵⁰⁾ When memory becomes impaired, previously acquired knowledge regarding beneficial and harmful activities cannot be properly recalled. Consequently, individuals repeatedly engage in unhealthy behaviors despite awareness of their adverse consequences. This defective utilization of knowledge ultimately contributes to physical, psychological, and social disorders.⁽⁵¹⁾

3.12 SMRITI VIBHRAMSHA: ETIOPATHOGENESIS AND CLINICAL SIGNIFICANCE

The integrity of *Smriti* is essential for proper cognitive functioning, decision-making, and behavioural regulation. Any disturbance in the mechanisms governing memory results in impairment of recollection, retention, and intellectual performance. Ayurveda describes such pathological alteration under the term *Smriti Vibhramsha*, which denotes distortion, deterioration, or loss of memory.

3.12.1 Definition of *Smriti Vibhramsha*

Charaka explains that when the mind becomes obscured by *Rajas* and *Tamas*, an individual loses the ability to recollect knowledge in its true form, resulting in *Smriti Vibhramsha*.⁽⁵²⁾ In such conditions, memory retrieval becomes defective, leading to inappropriate cognition and behaviour. Unlike simple forgetfulness, *Smriti Vibhramsha* encompasses a broader spectrum of memory dysfunction involving disturbances in cognition, judgment, perception, and behavioural responses.

3.12.2 *Nidana* (Etiological Factors)

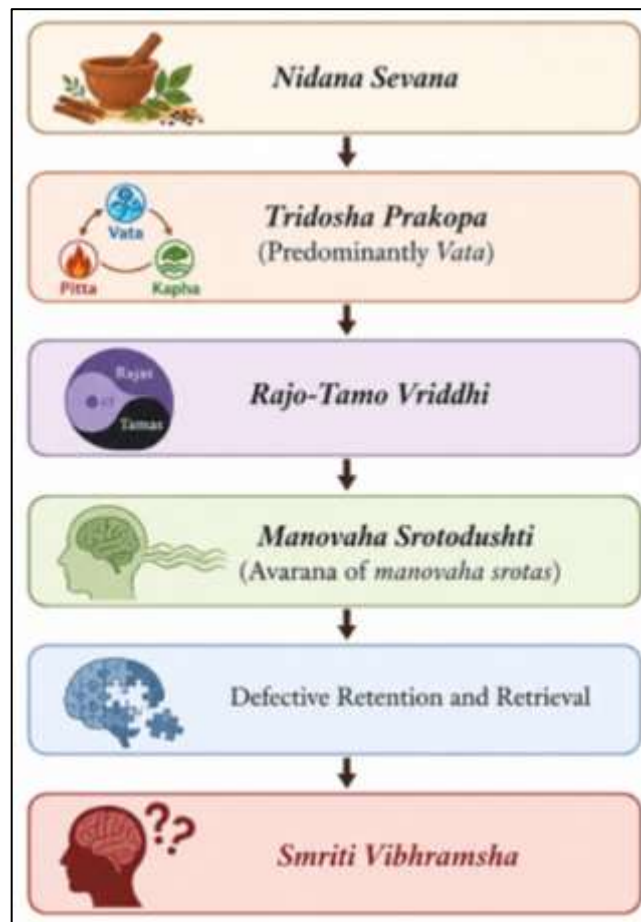
- *Divaswapna* (day sleep) in season other than summer can cause *Smriti budhi* pramoha⁽⁵³⁾
- Psychological stress

- *Gramya Ahara sevana* (unwholesome dietary habits) can lead to *nashtasmritibudhi* (loss of memory and intellect)⁽⁵⁴⁾
- Excessive indulgence in sensory pleasures
- Maternal alcohol consumption during pregnancy(*Madyanitya*) results in *Alpa smriti* of offspring ⁽⁵⁵⁾
- *Prajnaparadha* (intellectual blasphemy)
- Disturbance of *Manasika Doshas* (*Rajas* and *Tamas*)

3.12.3 Samprapti (Pathogenesis)

Although a complete Samprapti of *Smriti Vibhramsha* is not explicitly described in a single classical reference, scattered textual descriptions permit formulation of a probable pathophysiological model.

Figure 1. Proposed Samprapti of *Smriti Vibhramsha*



Vata predominance plays a central role due to its influence on neural communication, cognition, and sensory integration. Aggravation of *Rajas* and *Tamas* further impairs mental clarity and intellectual functioning, eventually resulting in memory dysfunction.

Role of *Raja* and *Tama* in *Smriti vibhramsha*

Ayurvedic psychology attributes mental disturbances primarily to the aggravation of *Raja* and *Tama Gunas*.⁽⁵⁶⁾ *Raja Guna* is characterized by excessive activity, emotional instability, restlessness, anger, desire, and agitation. Excessive *Raja* disturbs concentration and mental tranquility, thereby interfering with memory formation and retrieval.⁽⁵⁷⁾ *Tama Guna* is associated with ignorance, dullness, confusion, inertia, and cognitive obscuration. Predominance of *Tama* directly impairs learning, retention, and recollection, resulting in memory deficits and intellectual decline.⁽⁵⁸⁾ Memory functions optimally when *Satva* predominates.⁽⁵⁹⁾ Therefore, restoration of *Satva* and reduction of *Raja* and *Tama* constitute important therapeutic objectives in the management of cognitive disorders.

3.12.4 Clinical Features of *Smriti Vibhramsha*

- Difficulty in recalling previously learned information.
- Reduced retention of new knowledge.
- Confusion regarding past events.
- Defective judgment and decision-making.
- Poor concentration and attention.
- Intellectual inefficiency.
- Behavioural abnormalities arising from impaired recollection.

Smriti plays a significant role in the pathology of major *Manasika Vyadhis*. In *Unmada* (psychosis), there occurs *Smriti vibhrama* or perversion of memory due to which the patient either does not remember anything or remembers things incorrectly ⁽⁶⁰⁾ and altered perception of reality. Cognitive impairment contributes to inappropriate emotional responses, disturbed thinking, and abnormal behaviour. In *Apasmara* (epilepsy), perversion of memory (*smriti samplava*) and loss of consciousness constitute characteristic features of the disease. Recurrent episodes adversely affect memory retention and recollection .⁽⁶¹⁾

Smriti and *budhi* also get affected in *Atatwabhinivesha* (Psychic perversion) wherein the vitiated *doshas* affect the *Manobudhivaha sira* and the main cause for it is *Pranjaparadha* and to overcome that *vijnana, dhairya, smriti* and *samadhi* has to be instilled in the patient .⁽⁶²⁾

Other diseases where *smriti* is being affected include;

In *Madatyaya*, it is mentioned that *smriti* and *budhi* will not be impaired in the first stage of alcohol intoxication and in second stage the person often remembers things and often forgets them.⁽⁶³⁾ In *kardama visarpa* patient loses memory and consciousness.⁽⁶⁴⁾ Also in *avarana* of *vyana vayu* by *prana vayu smritikshaya* is mentioned as a symptom.⁽⁶⁵⁾ Sudden or unexplained loss of memory has been described among *Arishta Lakshana's* (fatal prognostic signs), suggesting severe systemic or neurological deterioration .⁽⁶⁶⁾

3.13 THERAPEUTIC APPROACHES FOR ENHANCEMENT OF *SMRITI*

Ayurveda advocates a multidimensional approach for preservation and enhancement of memory. These interventions include dietary regulation, lifestyle modification, psychological therapies, *Rasayana* treatment, and *Medhya Rasayana* administration.

3.13.1 *Satvavajaya Chikitsa*

Satvavajaya Chikitsa constitutes the Ayurvedic approach to psychotherapy. It aims at controlling the mind from unwholesome objects and promoting positive cognitive and emotional states. ⁽⁶⁷⁾ The primary objective of *Satvavajaya* is to strengthen *Satva Guna* while reducing the influence of *Raja* and *Tama*.

Important components of *Satvavajaya Chikitsa* include, Development of self-awareness, Mental discipline, Emotional regulation, Positive thinking, Spiritual counselling, Enhancement of concentration and attention

3.13.2 *Medhya Rasayana*

Medhya Rasayana represents a specialized group of Ayurvedic drugs known to improve intellect, memory, learning ability, and cognitive performance. Charaka specifically describes four principal *Medhya Rasayana* drugs, namely *Mandukaparni*, *Yashtimadhu*, *Guduchi*, *Shankhapushpi*.⁽⁶⁸⁾ Table 02 shows Pharmacological Actions of mentioned Drugs.

Table 02: Pharmacological Actions of four principal *Medhya Rasayana* drugs

<i>Medhya Rasayana</i> Drug	Botanical Name	Reported Cognitive and Neuroprotective Actions	References
<i>Mandukaparni</i>	<i>Centella asiatica</i>	Enhances cognition and memory through antioxidant, anti-inflammatory, and neuroprotective activities. Promotes neuronal growth and synaptic plasticity, thereby supporting learning and memory.	(69,70)
<i>Yashtimadhu</i>	<i>Glycyrrhiza glabra</i>	Exhibits neuroprotective and cognition-enhancing effects by reducing neuroinflammation and oxidative stress, while supporting neuronal survival and maintaining synaptic integrity.	(71)
<i>Guduchi</i>	<i>Tinospora cordifolia</i>	Improves learning and memory in both normal and memory-deficit experimental models. Demonstrates nootropic activity and protects cognitive functions, supporting its traditional use as a <i>Medhya Rasayana</i> .	(72)
<i>Shankhapushpi</i>	<i>Convolvulus pluricaulis</i>	Enhances learning and memory through nootropic, anxiolytic, antioxidant, and cholinergic mechanisms. Promotes hippocampal synaptic plasticity, contributing to improved cognitive function.	(73,74)

Classical texts also advocate purification therapies prior to administration of rejuvenative medicines. Appropriate *Shodhana* enhances tissue receptivity and facilitates optimal action of *Medhya Rasayana* drugs.

3.13.3 *Rasayana* Formulations:

Several *Rasayana* preparations have been described for promoting memory and longevity. Important formulations include *Amalakayasa Brahma Rasayana*⁽⁷⁵⁾, *Aindra rasayana*⁽⁷⁶⁾, *Triphala rasayana*⁽⁷⁷⁾, *Shilajatu rasayana*⁽⁷⁸⁾, *Indrokta rasayana* .⁽⁷⁹⁾ These formulations are believed to improve tissue nourishment, enhance *Ojas*, support neurological function, and maintain cognitive vitality.

3.13.4 *Ghrita* formulations

Medicated *Ghritas* like *Mahapaisachika ghrita* ⁽⁸⁰⁾, *Prapurana ghrita*⁽⁸¹⁾, *Panchagavya ghrita*⁽⁸²⁾, *Brahmi Ghrita*⁽⁸³⁾ etc are also believed to act as cognitive enhancers.

3.13.5 *Achara Rasayana*

Behavioral and ethical practices collectively known as *Achara Rasayana* play a significant role in maintaining mental health and memory.⁽⁸⁴⁾ Truthfulness, self-control, non-violence, respect toward elders and teachers, spiritual practices, emotional stability, and disciplined living contribute to cognitive well-being and preservation of memory .

3.13.6 Yoga & Meditation

Yoga and meditation are important non-pharmacological approaches for enhancing cognition and memory. They improve attention and mental clarity by reducing distractions, stabilizing *Manas*, increasing *Sattva*, and reducing *Rajas* and *Tamas*, thereby enhancing learning, retention, and recall.

3.14 CONTEMPORARY NEUROCOGNITIVE CORRELATES OF *SMRITI*

The Ayurvedic concept of *Smriti* demonstrates notable conceptual parallels with contemporary theories of cognition and memory, despite differences in terminology and explanatory models. Both systems describe memory as a dynamic process involving acquisition, retention, storage, and retrieval of information. While modern neuroscience attributes these functions to interconnected neural circuits involving the hippocampus, prefrontal cortex, amygdala, basal ganglia, and associated cortical regions, Ayurveda describes cognition as progressing from *Indriya* (sensory perception) to *Manas* (attention and coordination), *Buddhi* (analysis and discrimination), *Medha* (retention), and *Smriti* (recollection), with *Dhi* and *Dhriti* contributing to cognitive processing and behavioural regulation (Table 3). The Ayurvedic emphasis on *Abhyasa*, *Satvanubandha*, and *Punah Shruta*

as facilitators of memory closely corresponds to the modern concepts of repetition, rehearsal, and neuroplasticity. Likewise, the influence of emotional disturbances on memory, the importance of *Nidra* in cognitive function, and the role of sustained learning in preserving memory are consistent with contemporary evidence demonstrating that chronic stress impairs hippocampal function, whereas adequate sleep, physical activity, environmental enrichment, and lifelong learning enhance neuroplasticity, memory consolidation, cognitive resilience, and healthy aging. ⁽⁸⁵⁾⁽⁸⁶⁾

Table 3. Correlation between Ayurvedic Cognitive Faculties and Modern Neurocognitive Functions

Ayurvedic Concept	Functional Description	Contemporary Correlation
<i>Indriya</i>	Sensory perception	Sensory receptors and pathways
<i>Manas</i>	Attention and coordination	Attention, working memory
<i>Buddhi</i>	Analysis and discrimination	Executive functions, reasoning
<i>Medha</i>	Retention of knowledge	Memory consolidation
<i>Smriti</i>	Recollection and retrieval	Memory recall
<i>Dhi</i>	Understanding	Cognitive processing
<i>Dhriti</i>	Self-control and regulation	Behavioural inhibition and emotional regulation

3.15 MODERN CONCEPT OF MEMORY

Memory is a fundamental cognitive process involving the encoding, storage, consolidation, and retrieval of information, enabling learning, adaptation, and decision-making. ⁽⁸⁷⁾ Contemporary neuroscience describes memory as a dynamic function mediated by interactions among neural networks, neurotransmitters, and brain regions, particularly the hippocampus, amygdala, prefrontal cortex, and temporal lobes. ⁽⁸⁸⁾ Memory formation comprises four sequential stages: encoding, storage, consolidation, and retrieval, and impairment at any stage can result in cognitive dysfunction. ⁽⁸⁹⁾

Based on duration, memory is classified into sensory, short-term, and long-term memory. Based on content, it is categorized as explicit (episodic and semantic) and implicit (procedural, conditioned, and habit learning) memory. ⁽⁹⁰⁾ Working memory supports the

temporary storage and manipulation of information required for reasoning and executive functions.

The neurobiology of memory depends on coordinated activity of the hippocampus, which is essential for memory formation and consolidation; the amygdala, which regulates emotional memory; and the prefrontal cortex, which mediates working memory, planning, and retrieval. Neurotransmitters such as acetylcholine, dopamine, glutamate, serotonin, and gamma-aminobutyric acid (GABA) play critical roles in memory processing.⁽⁹¹⁾ Ageing, neurodegenerative disorders, oxidative stress, inflammation, and vascular pathology can impair these mechanisms and contribute to cognitive decline.⁽⁹²⁾

4. DISCUSSION

Smriti occupies a central place in Ayurvedic psychology and cognitive science, where memory is conceptualized as a multidimensional process resulting from the interaction of *Atma*, *Manas*, *Buddhi*, *Indriya*, *Doshas*, and *Gunas* rather than being confined to neural structures alone. The interrelationship of *Dhi*, *Dhriti*, and *Smriti* parallels the modern cognitive processes of encoding, storage, and retrieval, while the functional roles of *Prana Vata*, *Udana Vata*, *Sadhaka Pitta*, and *Tarpaka Kapha* provide a physiological framework for higher mental functions. Ayurveda further emphasizes the preservation and enhancement of cognition through *Achara Rasayana*, *Satvavajaya Chikitsa*, *Medhya Rasayana*, Yoga, and meditation, an approach increasingly supported by evidence demonstrating the benefits of healthy lifestyle practices, stress reduction, mindfulness, and herbal interventions on cognitive performance. The concept of *Smriti Vibhramsha* is particularly relevant in the context of age-related cognitive decline, mild cognitive impairment, dementia, and stress-associated memory disorders. Furthermore, experimental studies on *Medhya Rasayana* herbs, including *Glycyrrhiza glabra*, *Centella asiatica*, *Convolvulus pluricaulis*, and *Tinospora cordifolia*, have demonstrated neuroprotective effects through antioxidant activity, modulation of neurotransmitters, attenuation of neuroinflammation, enhancement of synaptic plasticity, and promotion of neuronal survival. Collectively, these findings highlight the potential of integrating Ayurvedic principles with contemporary neuroscience to support cognitive resilience and healthy aging.

5. CONCLUSION

Smriti is one of the principal cognitive faculties described in Ayurveda and a fundamental component of *Prajna*. Classical Ayurvedic literature conceptualizes memory as a

multidimensional process involving the coordinated interaction of *Atma, Manas, Buddhi, Indriya, Doshas, and Gunas*, with *Dhi, Dhriti, Medha, and Smriti* collectively governing cognition, learning, retention, and recollection. Ayurveda further recognizes that memory is influenced by physiological, psychological, ethical, lifestyle, and spiritual factors, emphasizing the roles of *Prana Vata, Udana Vata, Sadhaka Pitta, Tarpaka Kapha, Satva Guna, and Medhya Rasayana* in maintaining cognitive health. Although Ayurvedic concepts differ from contemporary neuroscientific models, they demonstrate notable conceptual parallels and may offer complementary perspectives for understanding cognitive decline, memory impairment, and mental health.

Conflict of Interest

The authors declare that there is no conflict of interest.

Funding

No external funding was received for this study.

Ethical Approval

Not applicable, as this is a review article based on published literature.

Author Contributions

All authors contributed substantially to the conception, literature review, drafting, critical revision, and final approval of the manuscript.

REFERENCES

- 1.Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/50. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 348.
2. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/149. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 348.
3. Acharya JT, editor. *Charaka Samhita of Agnivesa with Ayurvedadipika commentary*. Varanasi: Chaukhamba Orientalia; 2017. Chikitsasthana 9/3. p. 467.
- 4,5,6,7,8. Pallavi Ashok Ghadage, Niranjana Yethadka, Narendra Trivedi. A Review on *Smriti* (Memory) and its Affiliates in Ayurveda. J. Res. Tradit. Med 2017; 3(5): 143-150
9. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/98. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 336.

10. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/99. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 336.
11. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/100. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 337.
12. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/101. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 337.
13. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/102. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 337.
14. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/22-23. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 316,317.
15. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Vimanasthana 4/8. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p.166.
16. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Vimanasthana 4/8. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p.166.
17. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/54. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 325.
18. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/75-76. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 330.
19. Sharma RK, Dash B. *Charaka Samhita*. Vol. 1. Sutrasthana 11/20. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 211.
20. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/22. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 316.
21. Bhagvadgeeta, 2nd Chapter, 62-63 verse, 34th ed. Gorakhpur: Gitapress, p. 40
22. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 3/10. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 375.
23. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/140. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 346.
24. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/52. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 324.

25. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/72. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 329.
26. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/148-149. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 348.
27. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/20,21,22,23. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 315-317.
28. Vagbhata. Ashtanga Hridaya. T Sreekumar, translator. 5th ed. Thrissur: Publication Department, Harisree Hospital; 2017. Sutrasthana 12/4. p. 262.
29. Vagbhata. Ashtanga Hridaya. T Sreekumar, translator. 5th ed. Thrissur: Publication Department, Harisree Hospital; 2017. Sutrasthana 12/5. p. 263.
30. Vagbhata. Ashtanga Hridaya. T Sreekumar, translator. 5th ed. Thrissur: Publication Department, Harisree Hospital; 2017. Sutrasthana 12/6,7. p. 263.
31. Vagbhata. Ashtanga Hridaya. T Sreekumar, translator. 5th ed. Thrissur: Publication Department, Harisree Hospital; 2017. Sutrasthana 12/13. p. 267.
32. Vagbhata. Ashtanga Hridaya. T Sreekumar, translator. 5th ed. Thrissur: Publication Department, Harisree Hospital; 2017. Sutrasthana 12/17. p. 269.
33. Pallavi Ashok Ghadage, Niranjana Yethadka, Narendra Trivedi. A Review on *Smriti* (Memory) and its Affiliates in Ayurveda. J. Res. Tradit. Med 2017; 3(5): 143-150
34. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 4/37. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 406,407.
35. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Vimansthana 8/110. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 270.
36. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Vimansthana 8/103. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 268.
37. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Vimansthana 8/122. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 277.
38. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 4/36. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 406.
39. Ibidem, Bhagvadgeeta (1), 17th Chapter 7 verse, p. 254

40. Sharma RK, Dash B. *Charaka Samhita*. Vol. 1. Sutrasthana 13/41,42,43. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 255.
41. Sharma RK, Dash B. *Charaka Samhita*. Vol. 1. Sutrasthana 27/28. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 533.
42. Sharma RK, Dash B. *Charaka Samhita*. Vol. 1. Vimansthana 8/15. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 225.
43. Sharma RK, Dash B. *Charaka Samhita*. Vol. 1. Sutrasthana 7/58. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 161.
44. Sharma RK, Dash B. *Charaka Samhita*. Vol. 1. Sutrasthana 1/58. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 43.
45. Sharma RK, Dash B. *Charaka Samhita*. Vol. 1. Nidansthana 7/4. Varanasi: Chaukhambha Sanskrit Series Office; 2017. P.88.
46. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/98. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 336.
47. Sharma RK, Dash B. *Charaka Samhita*. Vol. 1. Sutrasthana 21/36. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 381.
48. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Vimansthana 4/8. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 166.
49. Sharma RK, Dash B. *Charaka Samhita*. Vol. 1. Sutrasthana 11/43. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 226.
50. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/101. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 337.
51. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/109. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 338.
52. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 1/101. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 337.
53. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sutrasthana 21/48. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 383.
54. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Chikitsasthana 1/2/3. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 26.

55. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Sharirasthana 8/21. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 474.
56. Vagbhata. Ashtanga Hridaya. T Sreekumar, translator. 5th ed. Thrissur: Publication Department, Harisree Hospital; 2017. Sutrasthana 1/21. p. 48.
57. Sharma PV. Sushruta Samhita. Vol. 2. 2022 ed. Varanasi: Chaukhambha Vishvabharati; 2022. Sharirasthana 1/18, p. 124.
58. Sharma PV. Sushruta Samhita. Vol. 2. 2022 ed. Varanasi: Chaukhambha Vishvabharati; 2022. Sharirasthana 1/18, p. 124.
59. Sharma PV. Sushruta Samhita. Vol. 2. 2022 ed. Varanasi: Chaukhambha Vishvabharati; 2022. Sharirasthana 1/18, p. 124.
60. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Nidanasthana 7/5. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 89.
61. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Nidanasthana 8/5. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 100.
62. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Chikitsasthana 10/58. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 454.
63. Sharma RK, Dash B. *Charaka Samhita*. Vol. 4. Chikitsasthana 24/43. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 394.
64. Sharma RK, Dash B. *Charaka Samhita*. Vol. 4. Chikitsasthana 21/38. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 272.
65. Sharma RK, Dash B. *Charaka Samhita*. Vol. 5. Chikitsasthana 28/202. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 275.
66. Sharma RK, Dash B. *Charaka Samhita*. Vol. 2. Indriyasthana 11/71. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 578.
67. Sharma RK, Dash B. *Charaka Samhita*. Vol. 1. Sutrasthana 11/54. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 230.
68. Sharma RK, Dash B. *Charaka Samhita*. Vol. 3. Chikitsasthana 1/3/30. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 46.

69. Gray NE, Alcazar Magana A, Lak P, Wright KM, Quinn J, Stevens JF, et al. *Centella asiatica*: Phytochemistry and mechanisms supporting cognitive function and neuroprotection. *Nutrients*. 2018;10(8):1049.

70. Rather MA, Thenmozhi AJ, Manivasagam T, Bharathi MD, Essa MM, Guillemin GJ. Neuroprotective role of *Centella asiatica* in cognitive impairment and neurodegenerative disorders: A review. *Front Pharmacol*. 2021;12:647593.

These studies describe antioxidant, anti-inflammatory and neuroprotective mechanisms that may support learning and memory.

71. Anand P, et al. *Glycyrrhiza glabra*: A review on pharmacological properties and neuroprotective potential. *Biomed Pharmacother*. 2020

72. Agarwal A, Malini S, Bairy KL, Rao MS. Effect of *Tinospora cordifolia* on learning and memory in normal and memory-deficit rats. *Indian J Pharmacol*. 2002;34(5):339–349.

73. Das R, Sengupta T, Roy S, Chattarji S, Ray J. *Convolvulus pluricaulis* extract can modulate synaptic plasticity in rat brain hippocampus. *Neuroreport*. 2020;31(8):597-604. doi:10.1097/WNR.0000000000001446. PMID: 32282574.

74. Sharma R, Singla RK, Banerjee S, Sinha B, Shen B, Sharma R. Role of Shankhpushpi (*Convolvulus pluricaulis*) in neurological disorders: An umbrella review covering evidence from ethnopharmacology to clinical studies. *Neurosci Biobehav Rev*. 2022;140:104795. doi:10.1016/j.neubiorev.2022.104795. PMID: 35878793.

75. Sharma RK, Dash B. *Charaka Samhita*. Vol. 3. Chikitsasthana 1/3/6. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 40.

76. Sharma RK, Dash B. *Charaka Samhita*. Vol. 3. Chikitsasthana 1/3/29. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 45.

77. Sharma RK, Dash B. *Charaka Samhita*. Vol. 3. Chikitsasthana 1/3/47. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 49.

78. Sharma RK, Dash B. *Charaka Samhita*. Vol. 3. Chikitsasthana 1/3/53. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 50.

79. Sharma RK, Dash B. *Charaka Samhita*. Vol. 3. Chikitsasthana 1/4/6. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 57.

80. Sharma RK, Dash B. *Charaka Samhita*. Vol. 3. Chikitsasthana 1/3/30. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 46.
81. Sharma RK, Dash B. *Charaka Samhita*. Vol. 3. Chikitsasthana 9/61. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 431.
82. Sharma RK, Dash B. *Charaka Samhita*. Vol. 3. Chikitsasthana 10/17. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 445.
83. Sharma RK, Dash B. *Charaka Samhita*. Vol. 3. Chikitsasthana 10/25. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 447.
84. Sharma RK, Dash B. *Charaka Samhita*. Vol. 3. Chikitsasthana 1/4/30-35. Varanasi: Chaukhambha Sanskrit Series Office; 2017. p. 63,64.
85. Hamel A, Mary A, Rauchs G. Sleep and memory consolidation in aging: A neuroimaging perspective. *Rev Neurol (Paris)*. 2023;179(7):658-666. doi:10.1016/j.neurol.2023.08.003. PMID: 37586942. ..85
86. Marzola P, Melzer T, Pavesi E, Gil-Mohapel J, Brocardo PS. Exploring the role of neuroplasticity in development, aging, and neurodegeneration. *Brain Sci*. 2023;13(12):1610. doi:10.3390/brainsci13121610. PMID: 38137058.
87. Kandel ER, Dudai Y, Mayford MR. The molecular and systems biology of memory. *Cell*. 2014;157(1):163–186. doi:10.1016/j.cell.2014.03.001. PMID:24679534.
88. Cabeza R, Nyberg L. Imaging cognition II: an empirical review of PET and fMRI studies. *J Cogn Neurosci*. 2000;12(1):1–47. doi:10.1162/08989290051137585. PMID:10769304.
89. Dudai Y, Karni A, Born J. The consolidation and transformation of memory. *Neuron*. 2015;88(1):20–32. doi:10.1016/j.neuron.2015.09.004. PMID:26447568.
90. Squire LR, Zola-Morgan AJ. Conscious and unconscious memory systems. *Cold Spring Harb Perspect Biol*. 2015;7(3):a021667. doi:10.1101/cshperspecta021667. PMID:25722431.
91. Sweatt JD. Mechanisms of memory. *Trends Neurosci*. 2010;33(4):167–173. doi:10.1016/j.tins.2010.01.002. PMID:20170950.
92. Aguilar-Hernández L, et al. Cellular mechanisms in brain aging: focus on physiological and pathological aging. *J Chem Neuroanat*. 2023;128:102210. doi:10.1016/j.jchemneu.2022.102210. PMID:36496000.