Nootropic efficacy of *Satvavajaya Chikitsa* and Ayurvedic drug therapy: A comparative clinical exposition

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**ABSTRACT**

**Introduction:** Ayurveda is known for philosophical basis, and its approach to psychological ailments is quite different from conventional system of management. *Satvavajaya Chikitsa* (Ayurvedic psychotherapy) is a nonpharmacological approach aimed at control of mind and restraining it from unwholesome *Artha* (objects) or stressors. Withdrawal of the mind from unwholesome objects is known as *Sattvavajaya Chikitsa* or it is a treatment by Self Control. Charaka defines it as a mind controlling therapy in which a stress has been laid on restraining of mind from unwholesome objects. Thus, it includes all the methods of *Manonigraha* and *Astanga Yoga* (*Yogic techniques*) too. Indian philosophy portrays *Astanga Yoga* as a primary tool to control mind; hence it can be used as *Satvavajaya Chikitsa*.

**Aims and Objectives:** To evaluate efficacy of *Satvavajaya Chikitsa* and *Aushadhiya Medhya Chikitsa* for improving *Smriti* in young healthy volunteers.

**Materials and Methods:** Totally, 102 physically healthy volunteers between age group 16 and 25 years were divided into two groups. In Group A, *Satvavajaya Chikitsa* was adopted in form of Yogic procedures such as *Asana*, *Pranayama*, Chanting etc., with counseling and placebo. Group B was *Shankhapushpi* tablets made with whole part of Shankhpushpi plant was used as standard control. The Weschler’s memory scale (WMS) was adopted to collect data before and after intervention period of 2 months. Paired and Unpaired *t*-test were used for analysis the data in Sigmastat Software.

**Results:** Group A (*Satvavajaya* + placebo) with counseling showed statistically highly significant result (*P* < 0.001) in verbal retention for similar pair, verbal retention for dissimilar pair and visual immediate tests; while Group B (*Shankhapushpi* tablets) showed significant result (*P* < 0.01) in auditory delayed, visual delayed, auditory recognition and visual recognition tests.

**Conclusion:** *Satvavajaya Chikitsa* shows better results in immediate recollection in terms of short-term memory; while *Shankhapushpi* found much better in long-term memory enhancement on various tests of WMS.

**Key words:** Memory; *Satvavajaya*; shankhapushpi; *Smriti*; yoga.
self-control that helps to discriminate between thoughts and actions and to pull out phobic nucleus. It adopts a comprehensive psychosomatic-spiritual approach to maintain the normalcy of mental health as well as bringing back its healthy state if it is impaired.\(^{[4,5]}\)

The term \textit{Smriti} (memory) denote a wide array of higher intellectual faculties including memory, cognition, past sense perception, mastery in mind. Though \textit{Smriti} is related to \textit{Atma} (soul) and \textit{Mana} (mind),\(^{[6]}\) Charaka has defined \textit{Satvavajaya} as \textit{Ahitebhyoarthebhyo Manonigraha} (withdrawal of the mind from unwholesome objects).\(^{[10]}\) Charaka also defines \textit{Sattvavajaya Chikitsa} as a mind controlling therapy in which a stress has been laid on restraining of mind from unwholesome objects. Thus, it may include all the methods of \textit{Manonigraha} e.g. \textit{Astita Yoga} (Yogic techniques). Indian philosophy portrays \textit{Astita Yoga} as a primary tool to control mind; hence it can be used as \textit{Satvavajaya Chikitsa}.\(^{[8]}\) Among all available techniques prevailing for control over mind, Yoga offers one of the best mind controlling methods, as it stresses on \textit{Chattavritti Nirodha} (control mind from different thoughts).\(^{[7]}\) The methods of self-hypnosis,\(^{[8]}\) positive suggestions,\(^{[9]}\) and counseling\(^{[10]}\) have been used as \textit{Satvavajaya Chikitsa} in recent studies.

Young people are more exposed to educational and competitive stress; which eventually result in an inability to concentrate and affect memory.\(^{[11]}\) Earlier studies suggest that yogic practices are found effective in improving the cognitive functions, attention and memory (visual and spatial),\(^{[12,13]}\) thereby resulting in improved academic performance.\(^{[14]}\) Adoption of Yoga practices in daily life can also help to reduce the educational and professional stress.\(^{[15,16]}\) In spite of number of such studies, no data are available until date to investigate the effect of \textit{Satvavajaya Chikitsa} (as Yoga therapy) on short-term and long-term memory enhancement.

\textit{Shankhapushpi} (\textit{Convolvulus pluricaulis} Choisy.) is a widely reputed \textit{Medhya} (nootropic) herb in Ayurveda.\(^{[9]}\) \textit{Shankhapushpi} has been used as a rejuvenator, anti-ageing, mental stimulant and tranquilizer, anti-stress and cognition enhancing potential; hence, it is recommended as a brain tonic to improve intellect, attention, concentration, memory and alleviate nervous disorders.\(^{[17]}\) Earlier preclinical studies on various extracts of \textit{Shankhapushpi} reported significant results on learning behavior and memory enhancement activity\(^{[18]}\) and recommended its usage as brain tonic to promote intellect and memory, alleviate nervous disorders and hypertension.\(^{[19]}\) In spite of plentiful preclinical researches already carried out, minimal clinical studies exploring its nootropic activity are available. Previous studies ascertain the beneficial effect of \textit{Shankhapushpi} in short-term memory,\(^{[20]}\) however, any published data on the efficacy of \textit{Shankhapushpi} on long-term memory are lacking.

The potency of single or compound drugs can be further augmented by conducting the \textit{Bhavana} process, by levigating the \textit{Churna} (powder) with their own juice or decoction.\(^{[6]}\) \textit{Bhavana} can be helpful in developing pharmaco-therapeutically potent new molecules. Various herbs including \textit{Shankhapushpi} have been mentioned to potentiate as \textit{Rasayana} through this process.

Though it is not a virgin territory of research, persuasive research to manage memory deterioration is still unmapped. Considering all these, the present clinical study is conducted to compare the therapeutic efficacy of \textit{Satvavajaya Chikitsa} (as Yoga therapy) with \textit{Aushadhiya Chikitsa} (medicine treatment) on \textit{Smriti}. As per scholar knowledge, the present study is the first of its kind to assess the comparative improvement in short-term and long-term memory with Yoga and drug therapy.

**MATERIALS AND METHODS**

**Source of patients**

One hundred and two physically healthy volunteers from Jamnagar city, Gujarat, who fulfill the inclusion criteria, were included in the study. A cross-sectional study was conducted on 102 volunteers, attending the OPD and IPD of IPGT and RA, Gujarat Ayurved University, Jamnagar, Gujarat, India. The volunteers were selected using simple random sampling by coin test and written informed consent was taken as per Helsinki declaration after offering sufficient explanations about the study and its aims. All patients were interviewed in the local language by a single person.

**Inclusion criteria**

Physically healthy volunteers [without any pathological condition, routine hematological viz. T.L.C., D.L.C., Hb\%, E.S.R. and P.C.V. and routine urine and microscopic examinations were carried out before treatment along with \textit{Dashavidha Prariksha} (10-fold examination)] having complaints of poor memory were selected on the basis of \textit{Smarana Shakti} (recollection power/memory). For assessment of memory, Weschler’s Memory Scale (WMS) test was performed.\(^{[21]}\) The individuals who have <10 score as per proforma were selected for the study. Age group ranging 16–25 years (mean 21.8 ± 0.52) was randomly selected without any bar of race, religion, and sex.
Exclusion criteria

Patients with neurological or psychological disturbances or under medication for systemic disease were excluded from the study.

Study design

In this randomized control trial, for assessment of memory, WMS tests were carried out before (pre) and after (post) 2 months intervention. To rule out any pathological condition, routine hematological viz. T.L.C., D.L.C., Hb%, E.S.R. and P.C.V. and routine urine and microscopic examinations along with Dashavidha Prariksha were carried out before treatment. Signed informed consent was obtained from each volunteer after giving detailed description of the study. Institutional Ethical Clearance obtained from Ethical Committee of the IPGT and RA, Jamnagar, and the study has been registered at CTRI (Number: CTRI/2013/10/004100).

Grouping and posology

Group A (trial group) was having fifty volunteers who were getting Satravaya Cikitsa, which include Yogic procedures, placebo [Table 1] and counseling for motivation. In placebo, four tablets (500 mg each tablet) were given for twice a day made with rice powder after food with milk as a vehicle for 60 days.

Group B (standard control group) having 52 volunteers who received four Shankhapushpi tablets (500 mg each tablet) were given for twice a day after food with milk as a vehicle for 60 days.

**Table 1: Baseline characteristics 102 of volunteers**

| Characters          | Categories | Percentage |
|---------------------|------------|------------|
| Age (years)         | 16-18      | 45.65      |
|                     | 19-23      | 54.35      |
| Gender              | Male       | 67.65      |
|                     | Female     | 32.35      |
| Religion            | Hindu      | 68.63      |
|                     | Muslim     | 31.37      |
| Marital status      | Married    | 60.78      |
|                     | Unmarried  | 39.22      |
| Socioeconomic status| Poor       | 2.94       |
|                     | Middle     | 91.30      |
|                     | Higher middle | 3.92  |
| Habitat             | Urban      | 74.51      |
|                     | Rural      | 25.49      |
| Physical activity   | Routine work | 58.82  |
|                     | Regular    | 39.22      |
|                     | Irregular  | 3.92       |
| Emotional makeup    | Normal     | 37.25      |
|                     | Tensile    | 37.25      |
|                     | Depressed  | 1.96       |
|                     | Anxious    | 54.90      |
| Mental stress       | Social     | 1.10       |
|                     | Professional | 97.83  |
|                     | Domestic   | 2.76       |

Preparation of Shankhapushpi tablet

*Shankhapushpi* (Convolvulus pluricaulis Choisy) powder made with whole plant of *Shankhapushpi* was given three *Bhavana* (trituration) of *Shankhapushpi* juice[1] and the tablets of 500 mg prepared in Pharmacy, Gujarat Ayurved University, Jamnagar. The confirmatory test for completion of *Bhavana* was done as per features of good trituration narrated in Ayurvedic classics.[22] Prior to clinical evaluation, the trial drug was subjected to preliminary pharmacognostic and phytochemical evaluation as per standard procedures.[23]

Criteria for assessment

The eight subtests of WMS were verbal retention for similar pair (VRSP), verbal retention for dissimilar pair (VRDP), auditory immediate, auditory delayed (AD), visual immediate (VI), visual delayed (VD), auditory recognition (AR) and visual recognition (VR). Specific scoring pattern was developed to assess the effect of therapies. The scoring was given to eight tests ranging from 0 to 5. Zero score given for all false answers and 5 score for all right answers.

The obtained data on the basis of observations were subjected to statistical analysis in terms of mean, standard deviation, standard error and Paired *t*-test. All statistical analyses were conducted (*P* < 0.001 as highly significant, *P* < 0.05 or *P* < 0.01 as significant and *P* < 0.10 as nonsignificant).

RESULTS

All 102 volunteers enrolled completed the study. It was found that maximum numbers of volunteers belonged to the age group of 19–23 years (54.35%), graduates (97.83%), secondary class students (2.17%), from middle class (91.30%), and vegetarians (65.22%). *Vishamagni* (abnormal status of digestive power) was found in 36.96%, *Vishamashana* (irregular or faulty dietary habits) in 76.09%, *Madhyama Kosta* (~normal digestion) in 67.56%, tea addiction in 73.91% and *Asamayaka Nidra* (disturbed sleep) in 82.61%. *Krodha* (anger) was found in maximum number of volunteers (59.45%). About 43.24% of volunteers had *Vata* dominant *Sharira Prakriti*. Additional baseline characteristics are depicted in Table 1. Schedule of Yogic practice taught and suggested are described in Table 2. The obtained results of eight subtests of WMS of both groups are detailed in Figures 1-3 and Tables 3 and 4 and paired and unpaired ‘*t*’ test results are mentioned in Table 5 and Tables 3 and 4 and paired and unpaired ‘*t*’ test results are mentioned in Table 5.

DISCUSSION

Male: Female ratio was 3:7; average weight of subjects was 54 ± 10 kg; average height of subjects was 157 ± 8 cm.
Amin and Sharma: Satvavajaya: A memory boosting ayurvedic psychotherapy

Verbal Retention for similar pair
GR. A 20.93% 34.94%
GR. B 7.02% 27.06%

Verbal Retention for dissimilar pair
GR. A 20.93% 34.94%
GR. B 7.02% 27.06%

Table 2: Schedule of Yogic practice taught and suggested

| First week | Minimum | Second week | Minimum | Third week | Minimum |
|------------|---------|-------------|---------|------------|---------|
| Pranadharana | 05 | Pranadharana | 05 | Pranadharana | 05 |
| Relaxation | 05 | Relaxation | 05 | Relaxation | 05 |
| Prayer | 05 | Prayer | 05 | Prayer | 05 |
| Rotation/stretches | 05 | Rotation/stretches | 05 | Rotation/stretches | 05 |
| Asana | 03 | Natarajasana | 03 | Natarajasana | 03 |
| Vrikshasana | 03 | Vrikshasana | 03 | Vrikshasana | 03 |
| Sarvangasana | 03 | Sarvangasana | 03 | Sarvangasana | 03 |
| Matsyasana | 03 | Matsyasana | 03 | Matsyasana | 03 |
| Shavasana | 03 | Shavasana | 03 | Shavasana | 03 |
| Pranayama | 05 | Anuloma-Viloma (3 rounds) | 05 | Anuloma-Viloma (3 rounds) | 05 |
| Bhramari | 05 | Bhramari | 05 | Bhramari | 05 |
| Shuddhi Kriya | 05 | Kapalbhati | 10 | Kapalbhati | 15 |
| Tratak on AUM | 05 | Tratak on AUM | 05 | Tratak on AUM | 05 |
| Dhama and Dhyana on AUM | 05 | Dhama and Dhyana on AUM | 05 | Dhama and Dhyana on AUM | 05 |
| Prayer | 05 | Prayer | 05 | Prayer | 05 |
| Total duration | 65 | Total duration | 70 | Total duration | 75 |

Third week procedures were continued till 2 months completion

Table 3: Effect of Sattvavajaya Cikitsa+placebo on 8 subtests of WMS

| WMS test | n | Mean score | df (%) | ±SD | ±SE | t | P (n=50) |
|----------|---|------------|--------|-----|-----|---|--------|
| Verbal retention for similar pair | 50 | 3.78 | 4.78 | 20.93 | 17.15 | 4.04 | 5.27 | <0.001 |
| Verbal retention for dissimilar pair | 50 | 3 | 4.61 | 34.94 | 19.48 | 4.6 | 7.52 | <0.001 |
| Auditory immediate | 50 | 2.39 | 4 | 40.28 | 14.17 | 3.34 | 12.17 | <0.001 |
| Auditory delayed | 50 | 2.5 | 4.28 | 41.55 | 18.36 | 4.33 | 9.50 | <0.001 |
| Visual immediate | 50 | 2.33 | 4.33 | 46.15 | 20.88 | 4.92 | 9.83 | <0.001 |
| Visual delayed | 50 | 2.9 | 4.39 | 32.91 | 18.6 | 4.26 | 7.43 | <0.001 |
| Auditory recognition | 50 | 3.88 | 4.5 | 19.75 | 35.19 | 8.29 | 2.66 | <0.01 |
| Visual recognition | 50 | 3.83 | 4.83 | 20.68 | 44.18 | 10.41 | 3.54 | <0.01 |

SD = Standard deviation, SE = Standard error, BT = Before treatment, AT = After treatment, WMS = Weschler’s memory scale

Table 4: Effect of Shankhapushpi tablet on 8 subtests of WMS

| WMS test | n | Mean score | df (%) | ±SD | ±SE | t | P (n=52) |
|----------|---|------------|--------|-----|-----|---|--------|
| Verbal retention for similar pair | 52 | 4.1 | 4.36 | 7.02 | 17.94 | 3.39 | 2.07 | <0.01 |
| Verbal retention for dissimilar pair | 52 | 3.04 | 3.86 | 27.06 | 35.54 | 6.72 | 2.16 | <0.01 |
| Auditory immediate | 52 | 2.79 | 3.93 | 41.03 | 19.56 | 3.7 | 7.99 | <0.001 |
| Auditory delayed | 52 | 2.68 | 3.96 | 48 | 33.66 | 6.36 | 4.34 | <0.001 |
| Visual immediate | 52 | 2.88 | 3.79 | 32.5 | 37.37 | 7.06 | 2.97 | <0.001 |
| Visual delayed | 52 | 2.79 | 4.04 | 44.87 | 26.75 | 5.06 | 5.89 | <0.001 |
| Auditory recognition | 52 | 2.92 | 3.54 | 20.73 | 33.89 | 6.4 | 2.0 | <0.05 |
| Visual recognition | 52 | 3.14 | 4.04 | 28.41 | 35.58 | 6.72 | 2.57 | <0.01 |

SD = Standard deviation, SE = Standard error, BT = Before treatment, AT = After treatment, WMS = Weschler’s memory scale
Mean age of subjects was 21.8 ± 0.52. Majority of subjects (97.83%) were medical and engineering students. It signifies the high level of stress (educational) and (professional) among these professionals.[24] Under such stress, he/she does not bring out his/her best, as extreme stress can result in mental health problems, which may tarnish their academic performance. Maximum volunteers were from middle socioeconomic status; maximum cases were reported to have Vishamagni which may be due to educational stress or other social issues in this age group. Majority of the volunteers (82.61%) were having disturbed and inadequate sleep. *Nidra* is responsible for *Jnana* (knowledge), as it is very essential mean for three stages of knowledge production that is, *Dhi* (intellect), *Dhriti* (retention) and *Smriti* (memory).[6] Disturbed or reduced sleep results in impaired transfer of data from short-term to long-term memory.[23,26] Maximum numbers of cases were found to possess the *Vata* and *Pitta* dominant *Prakriti*. *Prakriti* has direct relation with *Smriti*. *Pitta Prakriti* persons have been described as *Medhavi* (high intellect), *Nipuna* *Mati* (sharp memory),[6] which shows that these people have a high intelligence quotient. In contrast, *Vata Prakriti* persons have *Alpa Smriti* (poor memory)[27] and *Anavasthita Mati* (unstable psyche)[6] which signifies their poor ability to recall past incidences and poor decision taking power.

Group A (*Satvavajaya* + counseling + placebo) showed statistically highly significant result ($P < 0.001$) in VRSP, VRDP and VI tests [Figures 1 and 4]. *Yogic* procedures like balancing and forward bending type *Asana* (*yogic* postures) and *Pranayama* (breathing exercises) increase circulation of blood to brain that helps to calm the *Manas* and enhance concentration skills.[28] Balancing *Asana* activates *Ajna Cakra* (site between the brows) that allows an individual to find life rhythm, which further aids to health of *Manomaya Kosha* (site of intellectual conducts).[29] *Yogic* procedures regulate the movement of *Vata* that steer *Manas* and hence memory gets improved. *Sadrishya* (similarity) is one of the cause for *Smriti*[30] and hence the concentration and retention power for similar pair is increased. *Yogic* procedures control the *Cancalatva Guna* (mobility of *Vayu*)[6] and dwindle the *Rajas* and *Tamas Guna* which in turn helps to remove *Avarana* (covering) over *Buddhi* by channelizing *Vayu* to *Nadi* (i.e. *Ida*, *Pingala* and *Sushumna*). All these procedures increase the *Uha Shakti* (logic power) of a person to think with logic and proper reasoning. *Viparyaya* (dissimilarity) is also one of the reasons for *Smriti* improvement in VRD test.[6] The *Asana*, *Pranayama*, meditation, om chanting together with notional correction based on philosophy of yoga was found to improve both cognitive that is, visual perception and motor function.[31] It improves *Manasika Cancalatva* (unstable mind) and perks up the concentration of *Manas*,[6] *Shuddi Prakriya* (cleansing process) such as *Kapalbhati* (a type of breathing exercise) and *Trataka* (to concentrate on an object) eliminates the *Mala* (wastes) of the body[30] and also activates *Manas* for proper *Indriyabhigraha Karma* (manoeuvring the acts of senses). Therefore, the supportive role of *Yogic* procedures on zest, concentration and grasping power can be understood. *Yogic* procedures help in regeneration of neural tissues beside producing anti-stress effect;[32] therefore, attention, concentration power, retaining power and recall memory also get improved for longer time and memory of past heard things can be recalled very quickly. *Yogic* procedures in form of *Satvavajaya Cikitsa as Trataka* helps to clear unwanted and negative thoughts and reduces excessive thinking to make one sharp and attentive by balancing *Vata* and thus *Udana Vayu* is controlled, which is responsible for *Smriti*.[1]

In clinical trials as well as in practice, some therapists consistently achieve better outcomes than others, regardless of the treatment approach used. The approach that brings the positive outcomes is effective counseling or psychotherapy.[33] During counseling in group A, various interpersonal skills were taken care of during counseling viz. verbal fluency, interpersonal perception, affective modulation, expressiveness, warmth, acceptance, and empathy. The approach was persuasive and convincing. Adequate, acceptable (i.e., compatible interaction with attitudes, values, culture, and worldview of volunteer) and adaptive (i.e., providing means by which the volunteer can overcome his/her difficulties) explanation was given for the volunteer’s distress.

![Figure 3: Visual immediate and delayed test result](image)

![Figure 4: Auditory and visual recognition test result](image)
Group B (Shankhapushpi tablet) [Tables 3 and 4] showed significant result ($P < 0.01$) in comparison to Satvavajaya Chikitsa in AD, VD, AR and VR tests [Figures 1 and 4]. Medhya and Tridoshashamaka (balancing all three body humors) properties of Shankhapushpi helps to improve whole memory process that is, Cintya (things requiring thought), Vicarya (consideration), Ulyha (logic), Dhveya (attention) and Samkalpya (determination) consecutively. When a person wants to take any decision, he always passes through these five stages namely Cintanta (thought process), Vimarsa (to discriminate good and bad thought), Turka (logical thinking), Dhyana (meditation) and Samkalpa. The person making firm and fast decision may have powerful capacity of all these five. Here, Shankhapushpi via its Tridoshashamaka properties and Vata (regulator of Manas) controlling activity, helped to normalize the Rajs and Tamas properties of Manas. In addition, Shankhapushpi raises mental awakening by decreasing Avarana over Manas because of its properties which in turn improves retention power and Indriyabhiraha (to control over all senses) and Svanigraha Karma (withdrawal of mind from unworthy objects) of Manas. As a result, Manas can recognize the thing properly and this way Shankhapushpi does AR function also.

The probable mode of action of Satvavajaya Chikitsa in memory enhancement can be understood by recent reports on effect of different Yoga practices (including cleansing techniques, Asana, Pranayama, relaxation techniques, vedic chanting and meditation) on improving concentration, self-esteem, neuro-cognitive functions, attention level, visual and spatial memory, reducing daily stress and enhancing the academic or professional performance.

To understand the nootropic activity of Shankhapushpi, several mechanisms have been postulated: (i) Via increasing acquisition which increases brain protein content and enhances neuro-peptide synthesis of the brain (ii) as nervine tonic (iii) anti-stress activity (due to reduction in exploratory behavioral pattern and suppression of aggressive behavior, reduction in spontaneous motor activity, hypothermia, alterations in the general behavior pattern and potentiation of pentobarbitone sleeping time) (iv) anti-depressant activity (via its interaction with adrenergic, dopaminergic and serotonergic systems) (v) nootropic effects of flavonoids and (vi) potent anxiolytic, anti-acetylcholinesterase and neuroprotective activities.

To sum up, on overall comparison of both therapies, a significant result was found in both groups. Satvavajaya Chikitsa found to be better tool to increase memory in immediate response while Shankhapushpi respond in long-term memory. Therefore, the value of Yoga as an effective memory enhancer cannot be denied and it offers a much safer and affordable therapeutic option in mental ailments.

Limitation of study and future perspectives

In the present study, the sample size was limited and to account for heterogeneity among participants, the trial must be quiet large with a long duration of follow-up to achieve more fair statistical significance. Nevertheless, the outcomes of this study can be considered as lead for further well-stratified studies covering larger population. Future trials with similar nootropic herbs mentioned in classical texts should be encouraged to validate and ascertain the claims of traditional healers and ancient literature. A consorted management approach in psychotherapy by bridging Aushadhiya Chikitsa and Yoga would be highly desirable, which may explore new dimension of scientific research which is a reliable avenue to have holistic health. Emphasis should also be given toward integrated approach to understand the probable mode of action and mechanistic aspect of Yoga and this botanical.

CONCLUSION

Overall results for both the intervention viz. Satvavajaya Chikitsa (as Yoga therapy) and Aushadhiya Chikitsa (Shankhapushpi tablet) were significant for all the subtests of WMS. Satvavajaya Chikitsa shows remarkable improvement in immediate recollection in terms of short-term memory while Shankhapushpi found much better in long-term memory enhancement. Since both therapies also showed improvement in concentration, attention and self-esteem levels among volunteers, thereby enhancing their academic and professional performances, an integrative approach of management would provide a light of hope toward search of ideal treatment for memory impairment. This study
seems to be first of its kind in making comments on short-term and long-term memory. This knowledge once supported by more evidence can be used for population with specific targets.

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