Saraswati Panchak – A Novel Herbal Combination for Mental Health
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Abstract. Herbal medicines have a history of long therapeutic use and are still serving a lot of the health needs of a big population of the world. However, the quality control still remains a challenge because of the variation of chemical constituents involved. There are numerous compounds in herbal drugs that are in complex matrices in which no single active constituent is responsible for the overall efficacy. This creates a challenge in establishing quality control standards and standardization of finished herbal drugs. Saraswati Panchak is a novel combination given by Pandit Shri Ram Sharma Acharya for mental health. In this study, components of this novel herbal combination were explained for its potential utility in mental illness. In addition, the study also detailed how Saraswati Panchak Churna was converted into tablet form to increase the shelf life, make it easy to dispense, for dose fixation, etc. The tablet was subjected to organoleptic analysis and physico-chemical analysis to establish its efficacy. After performing complete analysis it was found that all the parameters are within the range. The coarse powder of these herbs may be used as havan samagri in brain related disorders because of the presence of nootropic herbs.

Keywords. Saraswati Panchak, quality control, tablet, Yagya therapy
Introduction

According to World Health Organization mental health is a “state of well-being whereby individuals recognize their abilities, are able to cope with the normal stresses of life, work productively and fruitfully, and make a contribution to their communities.” Although mental disorders reflect psychiatric disturbance, people may be affected by mental health problems (1). Mental illness accounts for about one-third of the world’s disability caused by all adult health problems, resulting in enormous personal suffering and socioeconomic costs (2). Severe mental health problems including major depressive disorder, bipolar disorder, schizophrenia and substance use disorders affect all age groups and occur in all countries. Mental illness is closely associated with poverty, wars, and other humanitarian disasters, and in some cases, leads to suicide, one of the most common causes of preventable death among adolescents and young adults (3).

A visionary seer sage Pt. Shri Ram Sharma Acharya long back ago realized the need of hour and given an ayurvedic combination named “Saraswati Panchak” to combat with above mentioned problems as the role of herbal medicine in the treatment of various psychological disorders has become well established over the past decade with phytotherapeutic preparations such as St John’s wort and kava possessing respectable clinical evidence (4).

Saraswati Panchak comprises of two words, ‘Saraswati’ and ‘Panchak’. The word Saraswati is the name of a goddess, and also symbolizes ‘intellect’. Panchak denotes a drug comprises of five elements. Saraswati Panchak is a novel herbal combination containing combination of drugs which are known for potential multiple benefits including mental illness and in psychological disorders. It contains five herbs—Brahmi, Shankhpushpi, Vach, Gorakhmundi and Satavari. The combination gives the properties such as ‘brain’ tonic, memory enhancer and general health tonic. Brahmi, Vacha, and Shankhapushpi are known Medhya Rasayana or nootropic herbs.

Nootropics are known as memory enhancers, brain tonics and cognitive enhancers. A cognitive enhancer is a substance that enhances memory and concentration. Nootropics are thought to work by altering the availability of the supply of neurochemicals (neurotransmitters, hormones and enzymes) in brain, by stimulating nerve growth or by improving the brain’s oxygen supply. Memory herbs are responsible to increase the level of neurotransmitters, particularly acetylcholine and improve blood flow to the brain, by increasing its oxygen and nutrient supply, which will aid memory and brain function (5).

This study presented the overview of the novel combination, its ayurvedic and modern mechanistic inside based on the literature, and its applications in the form of tablet and as a Hawan Samagri (for Yagya Therapy) as well as standardization of preparation of Saraswati Pnachak Vati (tablet) in the herbal pharmacy.

Herbs used in Saraswati Panchak

Brahmi (Bacopamonnieri)  

*B. monnieri* is a creeping perennial with small oblong leaves and purple flowers, found in warm wetlands, and native to Australia and India. It is commonly found as a weed in rice fields, the plant grows throughout East Asia and the United States (6). The whole plant is used medicinally. *B. monnieri* was initially described...
around the 6th century A.D. in texts such as the Charaka Samhita, Atharvaved, and Susrutu Samhita as a medhya rasayana–class herb taken to sharpen intellect and attenuate mental deficits. The herb was allegedly used by ancient Vedic scholars to memorize lengthy sacred hymns and scriptures (7).

Brahmi contains alkaloid nicotinine, herpestine, brahmine, bacosides A and B, saponins A, B and C, triterpenoidsaponins, β-sitosterol, stigmasterol, betulinic acid, D-mannitol, stigmasterol, α-alanine, glutamic acid, aspartic acid, and serine (8).

It is used traditionally to treat various nervous disorders, digestive aid, improve learning, concentration and memory to provide relief to patients with anxiety, and skin diseases; specific uses include the treatment of insanity, asthma and epilepsy (9–11).

The Bacopa herb, also called nootropic herb, helps in the repair of damaged neurons, neuronal synthesis, the restoration of synaptic activity, and improves brain function. Numerous studies suggested that B. monnieri’s bioactive components (ie, bacosides) protect the brain against oxidative damage and age-related cognitive deterioration with several mechanisms of action (12-13), the bioactive constituent, bacoside A was present in the B. monnieri extract (BME)-treated rat serum and could directly or indirectly interact with the neurotransmitter systems to improve memory and learning ability (14). A clinical study also suggested that the oral treatment with B. monnieri was able to enhance memory in both adults and children (15).

Shankhpushpi (Convolvulus pluricaulis)

C. pluricaulis is a perennial herb that seems like morning glory. Its branches are spread on the ground and may be more than 30 cm long. The flowers are blue in color and the leaves, which are elliptical in shape, are located at alternate positions with flowers or branches. Known as Aloe weed in English, the herb is commonly found in India, especially in the state of Bihar (16).

C. pluricaulis contains D-glucose, maltose, rhamnose, sucrose, shankhapushpine, convolamine, convoline, convoldine, convolvine, confoline, convosine, volatile oils, fatty acids, fatty alcohols, hydrocarbons, myristic acids, palmitic acids and linoleic acids, Scopoletin, β-sitosterol, ceryl alcohols, 20-oxodotriacontanol, tetratriacontanoic acids, flavonoid-kampferol, steroids-phytosterols (17). Shankhpushpi is a reputed drug of Ayurveda and reported as a brain tonic, nerve tonic, alternative and laxative (18-19). This plant is reported to be a prominent memory improving drug, a psycho-stimulant and tranquilize, and reduce mental tension. There are many references in Ayurvedic texts about the use of this drug as brain tonic in hypotensive syndromes (20).

Two important forms of synaptic plasticity known to be involved in the processes of memory formation are long-term depression (LTD) and long-term potentiation (LTP). In a study, the effect of C. pluricaulis plant extract on LTP and LTD were evaluated and found that prolonged treatment of C. pluricaulis extract, at a specific dose in healthy animals, can augment memory functions by modulating hippocampal plasticity (21).
**Vach (Acorus calamus)**

*A.calamus* (L.) (Sweet flag), a member of the family Acoraceae, generally used alone or in combination with other herbs in Indian and Chinese traditional medicine has generated great interest and is found to be beneficial (22). The plant is widely cultivated in different parts of sub-temperate and temperate regions of the world and is native to India, Japan, Sri Lanka, China, Mongolia, Burma, Europe, Southern Russia and Northern USA (23).

The oil contains varying concentrations of α-asarone, β-asarone, γ-asarone, calamenenolcalamene, calameone, camphene, α-pinene, β-pinene, p-cymene, eugenyl acetate, eugenol, isoeugenol, methyl isoeugenol, azulene, calamol, eugenol methyl ether, dipentene, methyl eugenol, asaronaldehyde, terpinolene, camphor, 1,8-cineole, α-caryophyllene and hydrocarbons (24-26). The oil also contains fatty acids such as palmitic acid and its ester, heptylic acid, an ester of butyric acid (27).

The traditional use of *A. calamus* in Indian Ayurvedic system is widely accepted. The plant has been used to cure many diseases like cough, fever, asthma, hysteria, epilepsy, depression, insomnia, mental retardation, skin diseases, haemorrhoids, dysentery, diarrhea, kidney and liver problems, bronchitis and as a sedative (28).

Methanol extracts of *A. calamus* showed significant acetylcholine esterase enzyme inhibition at a concentration 200 mg/mL (25). Houghton and coworkers reported the in-vitro acetylcholinesterase inhibitory effect of β-asarone and α-asarone. The AChE-inhibitory activity of the oil may be ascribed to β-asarone. Because memory and cognitive performance are related to acetylcholine, levels, the AChE-inhibitory effect of this plant may account for its traditional use (29).

**Gorakhmundi (Sphaeranthus indicus)**

*S. indicus* is a multi-branched herb having round purple flowers which grows plentifully in rice fields and is distributed throughout India, Malay, Ceylon, China and Africa. It is distributed throughout India, Sri Lanka, Africa and Australia from sea level to 1200 m altitude (30).

Large numbers of phytochemicals were isolated from whole plant, leaves and flowers of *S. indicus*. Aerial parts of this plant showed presence of an essential oil, glycosides, and eudesmanoids, an alkaloid phaeranthine and an isoflavone 5,4'-dimethoxy-3'-prenylbiochanin 7-α-β-galactosidewith some interesting sesquiterpene, n-pentacosan, hentriacontane, n-triacontanol, β-sitosterol, stigmasterol, β-D-glucoside of β-sitosterol, sphaeranthine and a phenolic glycoside. The essential oil, obtained by steam distillation of the whole herb, contains ocimene, α-terpinene, methyl-chavicol, α-citral, geraniol, α-ion one, β-ionone, d-cadinene, p-methoxy-cinnamaldehyde (31). All the parts of the *S. indicus* have medicinal uses.

In Ayurvedic system of medicine, the entire plant is used in tuberculous glands, insanity, indigestion, bronchitis, elephantiasis, anaemia, pain in the vagina and uterus, piles, biliousness, epileptic convulsions, leukoderma, dysentery, vomiting, urinary discharges, looseness of the breasts, hemicranias (32).

*S. indicus* flower derived constituents exhibits synergistic effect against acetylcholinesterase and possess potential antiamnestic activity (33).
Satavari (Asparagus racemosus)

A. racemosus grows throughout the subtropical and tropical parts of India up to an altitude of 1500 m. The plant is a spinous under-shrub, with, short rootstock bearing numerous succulent tuberous roots which are ash colored or silvery white externally and white internally. These roots are use in various medicinal preparations. The stem is climbing, woody, whitish grey or brown colored with small spines. The plant flowers during February–March leaving a mild fragrance in its surrounding and by the end of April, fruits can be seen with attractive red berries (34).

The powdered roots contain protein, saponins, carbohydrate and oil. The major active chemical constituents of Asparagus are a group of steroidal saponins. The plant also contains vitamins A, B1, B2, C, E, P, Mg, Ca, Fe, and folic acid. Other primary chemical constituents of Asparagus are essential oils, asparagine, arginine, tyrosine, flavonoids (kaempferol, quercetin, and rutin), resin, and tannin (35).

A. racemosus is a well-known Ayurvedic rasayana which prevents ageing, increase longevity, impart immunity, improve mental function, vigor and addvitality to the body and it is also used in nervous disorders, dyspepsia, tumors, inflammation, neuropathy and hepatopathy (36).

Methanolic extract of A. racemosus showed significant antidepressant-like activity almost certainly by inhibiting Monoamine oxidase (MAO-A and MAO-B) activity; and through interaction with adrenergic, dopaminergic, serotonergic and GABAergic systems (37).

Quality control parameters of Saraswati Panchakvati (tablet)

Procurement of plant material

The crude drugs for the preparation of SP were taken from the pharmacy of Shantikunj, Haridwar after proper authentication. Then, the physical impurities were removed and the drugs were washed with water and sun dried below 45°C. Dried drugs were stored in tightly closed containers. The crude drugs used in Saraswati Panchak with their botanical identities and parts used are given in Table 1.

| Drug Name   | Botanical Name       | Family            | Part Used   |
|-------------|----------------------|-------------------|-------------|
| Brahmi      | Bacopa Monnieri       | Plantaginaceae    | Whole Plant |
| Shankhpushpi| Convolvulus Pluricaulis | Convolvulaceae    | Whole Plant |
| Vach        | Acorus calamus       | Acoraceae         | Root        |
| Gorakhmundi | Sphaeranthus Indicus | Asteraceae        | Whole Plant |
| Shatawar    | Asparagus Racemosus   | Asparagaceae      | Root        |

Table 1. Components of ‘Saraswati Panchak’ combination
| Sr. No. | Test Parameters | Batch No. 1 | Batch No. 2 | Batch No. 3 | Batch No. 4 | Batch No. 5 | Batch No. 6 | Batch No. 7 | Limits       |
|--------|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| 1      | Description     |             |             |             |             |             |             |             | Brown colored, uncoated biconvex tablets with specific odour and bitter in taste |
| 2      | Weight variation (Table 3) | Within Limits | Within Limits | Within Limits | Within Limits | Within Limits | Within Limits | Within Limits | ±5%          |
| 3      | Hardness of tablet | 3.14        | 3.5         | 3.9         | 3.8         | 3.6         | 3.1         | 3.5         | 3.63          |
| 4      | Tablet disintegration time | 15 min      | 12.9 min    | 15.7 min    | 14.2 min    | 15.5 min    | 13.8 min    | 13.3 min    | 14.6 min NMT 15 min. |
| 5      | Friability Test  | 0.8         | 0.91        | 0.95        | 0.89        | 0.87        | 0.92        | 0.9         | 0.93 NMT 1%  |
| 6      | pH of 1% aqueous solution | 7.02        | 7.08        | 7.06        | 7           | 7.03        | 7.05        | 7.06        | NA           |
| 7      | Loss on drying at 105°C (%w/w) | 6.36        | 6.32        | 6.52        | 6.45        | 6.08        | 5.31        | 3.16        | 1.83 NA      |
| 8      | Total Ash (%w/w) | 10.89       | 11.75       | 10.52       | 11.38       | 12.48       | 18.38       | 12.74       | 12.92 NA     |
| 9      | Acid Insoluble Ash (%w/w) | 2.4         | 2.4         | 2.39        | 2.34        | 2.44        | 3.61        | 0.92        | 2.12 NA      |
| 10     | Alcohol Soluble Extrate (%w/w) | 3.29        | 3.26        | 3.26        | 3.21        | 3.28        | 13.11       | 19.25       | 18.31 NA     |
| 11     | Water Soluble Extrate (%w/w) | 38.86       | 31.78       | 40.58       | 37.76       | 39.58       | 43.47       | 39.12       | 43.06 NA     |
| 12     | Test For Heavy Metals: By AAS (all units in ppm) | Lead as Pb | 6.8         | ND*         | ND*         | ND*         | 5.2         | 0.76        | ND*          |
|        |                 | Mercury as Hg | ND*         | ND*         | ND*         | ND*         | ND*         | ND*         | ND*          |
|        |                 | Arsenic as As | ND*         | ND*         | ND*         | ND*         | ND*         | ND*         | ND*          |
|        |                 | Cadmium as Cd | ND*         | ND*         | ND*         | ND*         | ND*         | ND*         | ND*          |
|        | Test for Aflatoxins: By LCMSMS (all units in ppm) | B1 | ND*         | ND*         | ND*         | ND*         | ND*         | ND*         | ND*          |
|        |                 | G1 | ND*         | ND*         | ND*         | ND*         | ND*         | ND*         | ND*          |
|        |                 | B2 | ND*         | ND*         | ND*         | ND*         | ND*         | ND*         | ND*          |
| 13     | Parameter tested for Pesticide Residue | Azinophos-methyl | ND*         | ND*         | ND*         | ND*         | ND*         | ND*         | ND*          |
|        |                 | Diazinon | ND*         | ND*         | ND*         | ND*         | ND*         | ND*         | ND*          |
|        |                 | Dichlorvos | ND*         | ND*         | ND*         | ND*         | ND*         | ND*         | ND*          |
|        |                 | Malathion | ND*         | ND*         | ND*         | ND*         | ND*         | ND*         | ND*          |
|        |                 | Methidathion | ND*         | ND*         | ND*         | ND*         | ND*         | ND*         | ND*          |
|        |                 | Parathion | ND*         | ND*         | ND*         | ND*         | ND*         | ND*         | ND*          |
|        |                 | Parathion Methyl | ND*         | ND*         | ND*         | ND*         | ND*         | ND*         | ND*          |
| 14     | Test For Microbiology (Total count unit in (cfu/gm)) | Bacteria | 3200        | 33000       | 500         | 1570        | 680         | 24x10³      | 500          |
|        |                 | Yeast &Mould | 620         | 620         | 29          | 220         | <10         | 2x10³       | <10          |
|        | Any Specific Pathogens (unit in (cfu/gm)) | E.coli/gm | Ab          | Ab          | Ab          | Ab          | Ab          | Ab          | Ab           |
|        |                 | Salmonella/gm | Ab          | Ab          | Ab          | Ab          | Ab          | Ab          | Ab           |
|        |                 | S. aureus/gm | Ab          | Ab          | Ab          | Ab          | Ab          | Ab          | Ab           |
|        |                 | P. aeruginosa/gm | Ab          | Ab          | Ab          | Ab          | Ab          | Ab          | Ab           |

Table 2. Analysis of Saraswati Panchak Tablet (Vati). NA= Not Available as it is a new combination; ND=Not Detected; NMT=Not More Than; Ab=Absent
Batch No | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8  
---|---|---|---|---|---|---|---|---
Sample (readings) | 9 | 8 | 12 | 17 | 8 | 10 | 12 | 12
Mean (20 tablets weight in grams) | 13.02 | 13.05 | 13.01 | 13.13 | 13.01 | 13.06 | 13.07 | 13.18
Standard Deviation | 0.02 | 0.05 | 0.05 | 0.13 | 0.05 | 0.05 | 0.07 | 0.30
% variation | 0.14 | 0.41 | 0.08 | 0.99 | 0.10 | 0.45 | 0.51 | 1.37

Table 3. Weight Variation Test of Saraswati Panchakvati

Preparation of Saraswati Panchak tablet
All the authenticated crude drugs were crushed to a coarse powder separately and after that mixed thoroughly with eight parts of water in a stainless steel container. Then continuous mild heat was applied until it was reduced to one-fourth of its initial quantity. During heating, continuous stirring was done to avoid any deterioration due to burning of materials. After a desirable reduction in volume was achieved, the decoction was filtered through single folded cotton cloth and collected in a separate vessel. Then, the decoction was boiled again with addition of 10% accasia gum over slow fire on a gas stove, maintaining the temperature between 90°C and 95°C till a semisolid consistency is obtained. As the water evaporates, the viscosity of the extract increases resulting in ‘Ghana’ form (38). Then, the Ghana was mixed with the Churna of Saraswati Panchak (up to 10% of extract) further forming a solid mass. Now, the dissolved starch is mixed with the complete mixture. The solid mass (Ghana) was forced through a no. 16 sieve and granules were prepared and then dried at 50°C in a hot air oven for 16 hours. The dried granules were passed again through a no. 20 sieve. The combination was then compressed in a single-punch tablet press with a target weight of 650 mg.

Analysis of the Tablet as per Ayurvedic Pharmacopoeia of India (API)
Saraswati Panchak tablet were subjected to various analytical parameters (Table 2) as follows: 1) Organoleptic parameters: Rupa (color), Rasa (taste), Gandha (odor) and Sparsha (touch), 2) Physico-chemical parameters: pH of 5% aqueous solution, loss on drying at 110°C, ash value, acid insoluble ash, water soluble extractive, methanol soluble extractive, 3) Quantitative tests for tablet: Weight variation test (Table 3), table hardness test, tablet disintegration time, friability, 4) Toxicological: Heavy metal analysis, pesticide residue value, 5) Microbial overload: Bacterial and fungal growth study was carried out, 6) Reagents and chemicals: All the reagents and chemicals used for the study were of analytical grade.

Application of Saraswati Panchak coarse powder in Yagya Therapy
Yagya Therapy or Yagyopathy is an ancient Indian method of herbal inhalation therapy that allows for the pulmonary administration of herbs. In Kashyap Samhita an entire chapter named ‘Dhoopakalpa’ is dedicated on this subject. Various types of ‘Dhoopan’ are widely used in Ayurvedic treatments for various disorders. During this process, medicinal fume are generated by fumigating the desired herbs or minerals and patient is asked to inhale medicinal herbal fumes, which contains phyto-constituents that provide therapeutic advantages (39-40). The method of medicinal fume inhalation is not a new concept; rather, it prevailed in many traditional and cultural practices for pulmonary and neuronal diseases (41). Herbal fumes produced at high temperature are considered as a
A simple way of administering a drug, which exhibits rapid pharmacological activity when inhaled. The herbal medicine combination inhaled in this therapy first reach the brain, followed by lungs and other subtle components of the body. Thus, Yagya therapy has direct biochemical healing effect on CNS tissue diseases & complexities. Acharyas also described multiple drug formulae through nasal route particularly for CNS disorders. Ayurveda also recommended nasal route as a preferred mode of administration of drugs for epilepsy (42).

Now, Yagya Therapy has been proved as a tool for medicinal herbal fumes inhalation as it has shown therapeutic advantage in mental health (43) and epilepsy (44), Saraswati Panchak coarse powder can be used to cure brain related problems (45) as the specific energy currents reduced by Dhooopan and mantra can have significant remedial effect on the disorders & diseases ranging from headache, migraine, intellectual deficiency, depression, seizure disorders (46).

Conclusion
It is now widely accepted that the nature has best answer to all the diseases affecting the human body from time to time. This study has included the Ayurvedic treatments, which is described for mental disorders and are currently part of the Ayurvedic prescriptions. Thus, it could be concluded that the Ayurvedic system of herbal medicine is certainly a treasury of plant drugs for treatment of mental disorders which needs to be explored.

References
1. World Health Organization. Invest in mental health. Geneva: WHO, 2003.
2. Anderson P, Jane-Llopis E, Hosman C. Reducing the silent burden of impaired mental health. Health Promot Int. 2011;26 (1):4-9. DOI: https://doi.org/10.1093/heapro/dar051. https://doi.org/10.1093/heapro/dar051
3. Lake J, Turner MS. Urgent Need for Improved Mental Health Care and a More Collaborative Model of Care. Perm J. 2017;21:17-024. doi: 10.7812/TPP/17-024. https://doi.org/10.7812/TPP/17-024
4. Singh YN. Potential for interaction of kava and St. John's wort with drugs J Ethnopharmacol.2005;100(1-2):108-13.doi: 10.1016/j.jep.2005.05.014. https://doi.org/10.1016/j.jep.2005.05.014
5. Amin H, Sharma R. Nootropic efficacy of SatvavajayaChikitsa and Ayurvedic drug therapy: A comparative clinical exposition.Int J Yoga.2015;8(2):109-16.doi: 10.4103/0973-6131.158473. https://doi.org/10.4103/0973-6131.158473
6. Barrett SC, BrotherJL. Taxonomy and natural history of Bacopa in California. Syst Bot. 1978;5:408-419. https://doi.org/10.2307/2418753
7. AguiarS,Borowski T. Neuropharmacological review of the nootropic herb Bacopamonnieri. Rejuvenation research. 2013;16(4): 313-326. https://doi.org/10.1089/rej.2013.1431
8. Devishree RA, Kumar S, Jain AR. Short term effect of Bacopamonnieri on memory- A brief review. J. Pharm. Res. 2017;11:1447-1450.
9. Jyoti A, Sharma D. Neuroprotective role of Bacopamonniera extract against aluminium-induced oxidative stress in the hippocampus of rat brain. NeuroToxicol.2006; 27: 457-7. https://doi.org/10.1016/j.neuro.2005.12.007
10. Calabrese C, Gregory WL, Leo M, Kraemer D, Bone K, Oken B. Effects of a standardized Bacopamonnier extract on cognitive performance, anxiety, and depression in the elderly: A randomized, double-blind,placebo-controlled trial. J. Altern. Complement. Med. 2008 ;14: 707-713. https://doi.org/10.1089/acm.2008.0018
11. Kamkaew N, Scholfield CN, Ingkaninan, K, Taepavarapruck N, Chootip K. Bacopamonnier increaserecerebral blood flow in rat independent of blood pressure. Phytother. Res. 2013; 27: 135-138. https://doi.org/10.1002/ptr.4685
12. Saraf MK, Prabhakar S, Khanduja KL, Anand A. Bacopamonnier increasescopolamine-induced impairment of spatial memory in mice. Evid Based Complement Alternat Med. 2011;2011:236186.
13. Mukherjee S, Dugad S, Bhandare R. Evaluation of comparative free-radical quenching potential of Brahmi (Bacopamonnieri) and Mandookparni (Centellaasiatica). Ayu. 2011;32:258-264. https://doi.org/10.4103/0974-8520.92549

14. Rajan KE, Preethi J, Singh HK. Molecular and functional characterization of Bacopamonnieri: A retrospective review. Evid Based Complement Alternat Med.;2015:945217. https://doi.org/10.1155/2015/945217

15. Abdul Manap A S, Vijayabalan S, Madhavan P, Chia YY, Arya A, Wong E H, Rizwan F, Bindal U, KoshyS.Bacopamonnieri, a Neuroprotective Lead in Alzheimer Disease: A Review on Its Properties, Mechanisms of Action, and Preclinical and Clinical Studies. Drug target insights, 2019;13:1177392819866412. https://doi.org/10.1177/1177392819866412

16. Kumar DC. Pharmacognosy can help minimize accidental misuse of herbal medicine. Curr Sci. 2007; 93: 1356-1358.

17. Agarwal P, Sharma B, Fatima A, Jain SK. An update on Ayurvedic herb Convolvulus pluricaulisChoisy. Asian Pacific journal of tropical biomedicine. 2014;4(3):245-252. https://doi.org/10.1016/S2221-1691(14)60240-9

18. Panda S, Kar A. Inhibition of T3 production in levothyroxine-treated female mice by the root extract of Convolvulus pluricaulis. Horm Metab Res. 2001;33(1):16-18. https://doi.org/10.1055/s-2001-12620

19. Sairam K, Rao CV, GoelRK. Effect of Convolvulus pluricaulisChoisy on gastric ulceration and secretion in rats. Indian J Exp Biol. 2001;39(4):350-354.

20. Sethiya NK, Nahata A, Mishra SH, Dixit VK. An update on Shankpushpi, a cognition-boosting Ayurvedic medicine. Zhong Xi Yi Jie He Xue Bao.2009 ;7(11):1001-22. doi: 10.3736/jcim200911101. PMID: 19912732. https://doi.org/10.3736/jcim200911101

21. DasR, SenguptaT, 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. https://doi.org/10.1097/WNR.0000000000001446

22. Rajput SB. An overview on traditional uses and pharmacological profile of Acoruscalamus Linn. (Sweet flag) and other Acorus species. Phytomed: Int. J. Phytother. Phytofarm. 2014; 21 (3): 268-276. https://doi.org/10.1016/j.phymed.2013.09.020
36. Alok S, Jain S K, Verma A, Kumar M, Mahor A, Sabharwal M. (). Plant profile, phytochemistry and pharmacology of Asparagus racemosus (Shatavari): A review. Asian Pacific Journal of Tropical Disease. 2013;3(3): 242-251. https://doi.org/10.1016/S2222-1808(13)60049-3

37. Dhingra D, Kumar V. Pharmacological evaluation for antidepressant-like activity of Asparagus racemosus wild in mice. Pharmacology online. 2007; 3:133-52.

38. AcharyaYadavavjiTrikamji.Siddha Yoga Sangraha. 11th ed. Nagpur: Baidyanath Ayurveda Bhavana; 2000. p. 4

39. Joshi RR, Raghuvanshi M, Pandya P. Yagyopathy versus oral and iv drug administration: evaluation for pulmonary tuberculosis using compartment modeling. J Biol Syst. 2006;14(03):463-89. Available from: http://www.worldscientific.com/doi/abs/10.1142/S0218339006001891 https://doi.org/10.1142/S0218339006001891

40. Patel V, Mishra A, Shrivasat V. Pulmonary inhalation of medicinal smokes- an aspect of Yagya therapy: an effective therapeutic application and efficient drug delivery model of multiple herbs. In: National Medicinal Plants Board (Ministry of AYUSH, GovtOf India) sponsored National conference on Recent Advances in Ayurvedic Herbal Medicine -Dehradun. 2017:16th Sept

41. Mohagheghzadeh A, Faridi P, Shams-Ardakani M, Ghasemi Y. Medicinal smokes. J Ethnopharmacol. 2006;108(2):161-84 https://doi.org/10.1016/j.jep.2006.09.005

42. Jain S, TandonPN.Ayurvedic medicine and Indian literature on epilepsy. Neurol Asia. 2004;9(1):57-8. Available from: http://www.neurology-asia.org/articles/20043_057.pdf

43. Sharma S. YagyaChikitsaDwaraManasilSwasthya Par Padane Vale Prabha KaAadhayan (Hindi) (Dissertation).DevSanskritiVishwavidyalaya, Shantikunj, Haridwar, Uttarakhand, India; 2009

44. Mishra A, BathamL, VermaS, MishraS, ShrivasatavaV.Management of Epileptic Seizures through an Integrated Approach including YagyaTherapy, Interdisciplinary Journal of Yagya Research. 2019; 1(2): 52-64. https://doi.org/10.36018/ijyr.v2i1.24

45. Brahmavarchas, editor. YagyaChikitsakebuddhivammedhavardhakprayog. In: YagyaChikitsa, ShriVedmataGayatri Trust, Shantikunj, Haridwar (Uttarakhand), 249411, India; 2012. P. 223-224.

46. Babar RP ,Gund SM , Nandgaonkar J. Scientific Evaluation of ApsamarghanaDhoop (Herbal Fumagation) in the Management of Seizure Disorder in Children. International Ayurvedic Medical Journal, 2107; 5 (2) :475-481