Chapter -1
Introduction

In this competitive era, every human being wants to achieve highest goal. Furthermore, in routine life and in the social interactions too good cognition is always appreciated. Memory, attention and creativity represent three different cognitive domains, which are interconnected and contribute to the "mental performance" of an individual (Shiksharthi, 2012).

Cognition is a psychological phenomenon which originates from physiological and anatomical processes, and is influenced by both nature and nurture. The term cognition refers to the processing of information, applying knowledge, and changing preferences. According to Neisser (1967), cognition is the process through which information coming from senses is "transformed, reduced, elaborated, recovered and used". The term information, used here, refers simply to sensory input from the environment that informs us about something that is happening there. Cognition is the physiological process of knowing, including awareness, perception, reasoning, and judgment. Cognitive functions are mainly categorized into memory, attention, creativity and intelligence.

Cognitive processes are thus the mental processes involved in knowing about the world, as such, they are important in perception, attention, thinking, problem solving and memory. It is an elemental condition necessary for competent dealings in different spheres of life and can be inferred from an individual's performance on a content related task.

One important aspect of cognition is attention. It is a general term for selectivity in perception. The selectivity implies that at any instant a perceiving organism focuses on certain aspects of the stimulus situation to the exclusion of other aspects. Attention is the means by which one actively processes a limited amount of information from the enormous of information available through the senses, memory stores, and other cognitive processes (De Weerd, 2003; Duncon, 1999; Motter, 1999; Posner and Fernandez- Dugue, 1999; Rao, 2003). It includes both conscious and unconscious processes. Conscious processes are relatively easy to study while
unconscious processes are harder to study because one is not conscious of them (Jacoby, Lindsay and Toth, 1992; Merkle, 2000).

A cognitive task is defined as any task in which appropriate processing of mental information is critical to successful performance. While a cognitive process is the process in which mental contents are operated upon to produce some response. The cognitive processes can however take many forms. Some of these processes are involved in understanding the requirement of a task, the types of stimuli to be presented, what kind of responses are to be made, and (sometimes) the time allotted for performance and how the responses are to be scored and evaluated.

Recent years have seen a sudden surge in an array of mental illnesses such as dementia and other cognitive decline. Dementia is defined as the loss of cognitive or intellectual functions. Unlike occasional forgetfulness, dementia is marked by a profound impairment of memory as well as the loss of additional, complex abilities required for problem- solving, decision making, spatial orientation, and even the ability to put simple words together to communicate. Environmental toxins, vitamins deficiencies and the process of aging can alter cognition (Levy, 1994). Stressful lifestyle in this competitive world may be the root cause. Age, stress and emotions are the conditions that may lead to memory loss, amnesia, anxiety, high blood pressure, dementia, and to more ominous threat like schizophrenia and Alzheimer’s disease (Vasudevan and Parle, 2006). Cognitive impairment is the major health problem in normal aged life as well as in some disease conditions.

Cognitive dysfunction, a major health problem in 21th century, is one of the most functionally debilitating aspect of many neuropsychiatric disorders and neurodegenerative disorders, such as schizophrenia, depression, AD dementia, cerebrovascular impairment, seizure disorders, head injury, and parkinsonism (Ceskova, 2005). Aging play an important role in development of cognitive dysfunction such as age associated memory impairment (AAMI) by causing impairment in long term potentiation (LTP) induction and synaptic plasticity (Rosenzweig, and Barnes, 2003). Cognitive changes in old age are driven by two distinct processes: gradual and in our present state of knowledge, irreversible degenerative changes in the central nervous system (Rockstein and Sussman, 1979).
Cognition is subjective in nature and can be affected by number of factors including ageing, stress, hypertension, various pathological conditions such as dementia related to Parkinson’s disease (PD), Alzheimer’s disease (AD), schizophrenia, cancer and HIV (Lanni, Lenzken and Pascale, 2008; Ringman and Cumming, 2006). Cognitive enhancement may be defined as the amplification or extension of core capacities of the mind through improvement or augmentation of internal or external information processing systems. So there is a need of enhancement the cognition.

Cognitive enhancement can involve various mechanisms such as:

- Increasing circulation to the brain.
- Providing precursors to neurotransmitters (chemical messengers in the brain).
- Providing usable energy to the brain.
- Improving neuron function.
- Preventing free radical and oxidative damage to brain cells and others.

ENHANCEMENT OF COGNITION:

In a general sense, ‘cognitive enhancers’ are drugs, supplements, nutraceuticals and functional foods that improve some aspect of brain function/ mental functions such as cognition, memory, intelligence, motivation, attention, and concentration. Cognitive enhancement may be defined as the amplification or extension of core capacities of the mind through improvement or augmentation of internal or external information processing systems. The enhancement aspects of cognition, such as learning and memory, now seem possible for people with normal age related decline and in healthy people, although so far the effects of these cognition enhancers are modest.

Cognition enhancers are medications and natural supplements that are used to improve the function of various human cognitive abilities such as cognition, memory, intelligence, motivation, attention and concentration when they have become impaired in some manner. Sometimes referred to as nootropics, or smart drugs, the cognition enhancers may be used to combat health conditions that interfere with the process of learning, motor control and the maintenance of a healthy emotional state. They are mostly used for enhancing mental
concentration and increasing memory capabilities and are available in various items such as
prescription medication, supplements and functional foods.

A nootropic is a cognitive enhancer that is neuroprotective or extremely nontoxic (Morein- Zamir, 2007). Nootropics are popularly referred to as “smart drugs”, “smart nutrients”,
“cognitive enhancers”, “brain cognitive abilities” (the functions and capacities of the brain). The
term covers a broad range of substances including drugs, nutrients and herbs that have purported
cognitive enhancing effects. Nootropics are thought to work by altering the availability of
the brain’s supply of neurochemicals (neurotransmitters, enzymes, and hormones), by
improving the brain’s oxygen supply, or by stimulating nerve growth. Smart drugs can
basically do three different things to the brain: minimize the damage to the brain and the natural
deterioration of one’s brain functions, repair some of the damage already done or enhance brain
functions above usual levels (Bhowmik, Chiranjib, Tiwari, Tripathi, and Kumar; 2010). Nootropic
agents such as piracetam (Schever, Rostock, Bartsch and Muller, 1999),
nefiracetam, aniracetam (Cumin, Handle, Gamzu and Haefely, 1982) and choline esterase
inhibitors like donepezil are being primarily used to improve memory, mood and behavior.
However, the resulting adverse effects associated with these agents have limited their use
(Blazer, Federspiel, Ray, Schaffner, 1983; Rogers, Farlow, Doody, Mohs, Friedhoff, 1998).
Some of the side effects include nausea, nervousness, dizziness, drowsiness, fatigue, headache.

The term cognitive enhancer should not be confused with the word “nootropic”. Nootropics are by definition cognitive enhancers, but a cognitive enhancer is not necessarily a
nootropic. A cognitive enhancer is a substance that enhances concentration and memory.
Nootropics are referred to as smart drugs, memory enhancers, and cognitive enhancers (Lanni,
Lenzken, Pascale, Vecchio, Racchi, Pistoia and Govoni, 2008).

Many different strategies are proposed to enhance cognition. Most interventions target
either disease pathologies or the processes underlying normal cognition, particularly synaptic
plasticity. Many act via more than one pathway or target. Strategies and treatments for cognition
enhancement are given as follows:

• Pharmaceutical drugs
• Advanced techniques and medical devices
Pharmaceutical Drugs:

A number of pharmaceutical compounds are in the market which has been used for their cognition enhancing property e.g. Methylphenidate (Ritalin). Drugs to improve memory generally work by altering the balance of particular chemicals (neurotransmitters) in the brain that are involved in the initial learning of a memory or its subsequent reinforcement. Some acts by selective enhancement of cerebral blood flow and metabolism, including enhanced glucose uptake, which may protect against the effects of hypoxia and ischemia. Drugs which act as cognition enhancer increase synaptic plasticity by, regulating release of neurotransmitter from the pre-synaptic terminal and increasing sensitivity and specificity of receptors and ion channels in the membranes of synapse to neurotransmitter signaling. Some of the agents also modulate the process at transcriptional and translational level. A drugs or substances acting on neurotransmitter level.

A. Drugs or substances acting on neurotransmitter level – Acetylcholine, Nicotine, Excitatory amino acid, Monoamines, Adenosine.

B. Drugs increasing blood flow and enhance brain metabolism – Vinpocetine, nimodipine, pyrrolidinones (racetams), ergot alkaloids.

C. Drugs directed at transduction mechanisms - PDE9 inhibitor BAY 73 6691, Other phosphodiesterase inhibitors (PDEIs) such as PDE4 (e.g. Rolipram), PDE5 (e.g. vardenafil) PDE2 (e.g. BAY 60-7550).

D. Drugs acting via neuroprotection and neural growth - vasopressin, somatostatin, growth hormone, insulin-like growth factor-1, (IGF-1) neuropeptide Y, orexins, vasoactive intestinal polypeptide, glucagon-like peptides, galanin, nociceptin/orphanin FQ, pro-opiomelanocortin derivatives, Thyrotropin-Releasing Hormone (TRH) and others (Bennett, Ballard and Watson, 1997).
Advanced techniques and Medical devices:

Various non-invasive techniques and invasive medical devices are used to improve cognitive function. Non-invasive techniques include behavioral techniques or assistive software that provides new strategies to restoring memory and planning. Electromagnetic stimulation and biofeedback that modulate activity in a patient’s brain as part of a rehabilitation program is one of the non-invasive technique (Serruya and Kahana, 2008).

Invasive approaches may improve cognition by using implantable medical devices that are able to record and stimulate specific brain region to restore cognition. Chronic bilateral deep brain stimulation (DBS) of the subthalamic nucleus (STN) or globus pallidus interna are effective neurosurgical procedures for treatment of motor symptoms in patients with advanced PD who cannot be satisfactorily treated with pharmacological treatments (Vale, 2008).

Environmental enrichment and exercise:

Environmental enrichment improves learning and memory, apparently by changes in gene expression related to structure of neuron, synaptic plasticity and transmission. Such changes might be prompted via neurotrophin expression (e.g. BDNF). Similar findings in elderly people are that leisure activities and physical exercise are linked with lower risks of dementia and cognitive decline respectively (Engelborghs and Deyn, 1997).

Foods and Nutrients:

Eating the right diet may also increase and help retain the memory’s capacity. Leafy greens and cruciferous vegetables like broccoli, cabbage, spinach and Swiss chard are recommended by some researchers, as are berries, plums, and cherry tomatoes. The Omega-3 fatty acids found in fish like salmon, herring, and anchovies are also thought to help memory retention. Micronutrient status can affect cognitive function at all ages. Many dietary supplements are recommended by various sources to improve cognition, including 'nutraceuticals' dietary components or similar that act like drugs. These agents are widely available in market. Such agents are usually well tolerated and no abuse potential is reported. It mainly includes vitamins, neutrasteroids and fatty acids. Vitamin E is found to have antioxidant and free radical scavenging property. Also some findings showed that deficiency of vitamin B6,
B12 and folate might contribute to age-associated cognitive impairment. Other includes Acetyl-L-carnitine, Alphalipoic acid, Lecithin, Thiamine, but there is no significant evidence of their efficiency in clinical trials. Melatonin is a hormone with clock-setting properties that is secreted at night from the pineal gland, at levels that decrease with ageing. Positive effects of melatonin have been reported on sleep and cognition in elderly people (Gilbert, Kesner and DeCoteau, 1998).

Physical Acts:

Challenging your brain with simple exercise can also help your memory according to some scientists. Try showering and dressing with your eyes closed, play crosswords or Sudoku in the morning paper, or take a class on an activity or topic one is unfamiliar with. Alone or in combination, these natural memory enhancers may stem the tide of memory loss and maybe even bring a little back.

Herbal medicines:

In traditional practices of medicine, numerous plants have been used to treat cognitive disorders, including neurodegenerative diseases such as Alzheimer's disease (AD) and other memory related disorders. Various studies have been undergone to identifying potential new drugs from plant sources, including those for memory disorders. There are numerous drugs available in market that have been isolated from plants, e.g. alkaloids from plant sources have been investigated for their potential in AD therapy, and are now in clinical use. Usually herbal preparations are well tolerated but they may have harmful side-effects, including interactions with pharmaceuticals. Herbal medicines commonly used, such as, Ginkgo Biloba, Brahmi (Bacopa moniera), Amalaki (Emblica officinalis), Punarnava (Boerhaavia diffusa), Mandukaparni (Hydrocotyle asiatica), Ashwagandha (Withania somnifera), Galo (Tinospora cordifolia), Yashti-madhu (Glycyrrhiza glabra), Shankhapushpi (Convolvulus pluricaulis and Evolvulus alsinoids), Vacha (Acorus calamus), Shatavari (Asparagus racemosus) (Shah and Anand, 2003). Some of the herbal medicinal plants with potential cognitive enhancement activity.
NATURAL CONITION ENHANCERS:

The Indian traditional system of medicine offers a number of safe treatments for central nervous system related disorders such as anxiety and memory loss. These nature derived treatments are effective and devoid of any untoward effects.

Herbs have been highly valued and used regularly for thousands of years by people of the world as medicine of the masses. Man has always searched for that herb that heals the body and soothes the mind and there has never been a shortage of vegetation to investigate with some 20,000 species that have been used by various cultures. Medicinal plants have been used to treat such psychotropic and behavioral conditions as anxiety, depression, seizures, poor memory, dementia, insomnia and drug intoxication (Jonathan, 2006).

The important natural and herbal cognitive enhancers include - Amino acids and Proteins (L-carnitine, L-cysteine, L-glutamine, L-phenylalanine, L-tryptophan, L-tyrosine), Antioxidants {Alpha Lipoic Acid (ALA), Anthocyanins, Flavonoids, Tannins, Phenolic acids and Stilbenoids, Isoflavones, Polyphenolics}, Dimethylaminoethanol (DMAE), Glucose, Hormones {Dehydroepiandrosterone (DHEA), Pregnenolone, Vasopressin}, Iron, Omega-3 Fatty acids {alpha-linolenic acid, Docosahexaenoic acid (DHA)}, Phospholipid Derivatives (Phosphatidyl choline, Phosphatidylycerine), Vitamins {Vitamin-B1 (Thiamine), Vitamin-B12 (Cyanocobalamine / Methylcobalamine), Vitamin-B3 (Niacinamide), Folic acid, Choline}, Amla (Emblica Officinalis), Brahmi (Bacopa monniera), Caffeine (Kola vera), Cinnamon (Cinnamomum zeylanicum), Coconut Milk Powder (Cocos nucifera), Curcumin (Curcuma longa), Ginger (Zingiber officinale), Ginkgo (Ginkgo biloba), Golden Rose / Golden Root (Rhodiola rosea), Gotu Kola (Centella asiatica), Green Tea (Camellia sinensis), Guduchi (Tinospora cordifolia), Liquorice (Glycyrrhiza glabra), Lycopodium saururus (Huperzia saururus), Maca (Lipidium meyenii), Magnolia Bark (Magnolia officinalis), Red Spider Lilly (Lycoris radiata), Sesame (Sesamum indicum), Shankpushpi (Evolvulus alsinoides), Siberian Ginseng (Eleutherococcus senticosus), Spanish Sage (Salvia lavandulaefolia), St John’s Wort (Hypericum perforatum, Sweet Flag (Acorus calamus), Vinpocetine, Yerba mate (Ilex paraguayensis) (Tabassum,
Rasool, Malik, Ahmad, 2012). These are becoming widely available and can be found in combination in brain boosting supplements, as well as in certain foods.

Several other herbal drugs which are claimed to possess memory enhancing activity in different traditional systems of medicines are: Polygala tenuifolia, Biota orientalis, Codonopsis pilosula, Crocus sativus (Abe and Saito, 2000), Evodia rutaecarpa, Tinospora cordifolia, Gastrodia elata, Coptis chinensis, Clitoria ternatea, Centella asiatica (Nalini, Aroor, Karanth and Rao, 1992) and so on.

Mental illnesses have always been intriguing for the researchers and their treatment a challenge. As already mentioned allopathic psychoactive drugs have been the main stay of treating mental illness in India and worldwide. However experiences with these drugs have always been satisfying. To compound to this, the associated side effects become detrimental to their use (Hanumanthachar, 2006; Kulkarni, and Verma; Kumar, Sapna, and Ravi, 2007). Indian subcontinent rely on traditionally medicine mainly Ayurvedic drugs.

Ayurveda, the Indian system of medicine is one of the oldest systems of medicine, dating back to 5000 BC (Mishra, Singh, and Dagenais, 2001; Titus, 1995). Its objective is to accomplish physical, mental, social and spiritual well-being by adoptive preventive, health promoting and holistic approach towards life (Patwardhan, Warude, Pushpangadam, and Bhatt, 2005). It is a complete and holistic science of healthy balanced living which views each person as an individual, with a unique mind-body constitution and set of life circumstances. The mention of ayurveda can be found in Atharva-Veda. It is how even in Ayurveda that the specific properties of plants and their use as medicinal drug have been dealt with in great detail. ‘Ayurveda’ literally translated means science of life. Ananthacharya (1939) in defining this system of medicine said; ‘Ayurveda scrutinizes the subtle process of life, studies its nature, ways and conditions of development and deduces there from a universal course of conduit for man’s guidance in life’ (Ananthacharya, 1939; Ninivaggi, 2008; Wujastyk, 2003).

In Ayurveda there are three aspects of mental ability-

1. Dhi (Process of acquisition / learning)
2. Dhuti (Process of retention)
3. Smriti (Process of recall)

Any disturbance in these aspects resulted in the loss of mental ability.

Ayurvedic treatment involves detoxification therapies, herbs, oil treatment, diet and lifestyle changes. Either one or all of the treatments are chosen, based on many factors (Gogtay, Bhatt, Dalvi, and Kshirsagar, 2002). In India, the knowledge of herbal medicine is extended from tribal folklore to highly evolved system of medicine like Ayurveda, Sidda and Unani. The World Health Organization (WHO) estimates that 80% of the world’s population presently uses herbal medicine for some aspects of primary health care (Howes and Houghton, 2003). Recently, the interest in the use of herbal products has grown dramatically in the western world as well as in the developing countries (Kashmira and Patel, 2010).

Human nervous system deteriorates with age through natural ageing process and sometimes due to drinking or smoking. This deterioration is usually caused by an oxidation process, which destroys brain cells and form free radicals that cause further havoc in one's brain. Even though brain cells likely cannot regenerate, it is possible to deactivate free radicals and repair some of the other damage (such as low levels of electric current transmitting chemicals in the brain). And this can be achieved with smart drugs and some nutrients, such as vitamins, antioxidants, amino acids, choline and lecithin. Since time immemorial, plants have played an integral part in the development of human civilization. Today, interest in the plant products has increased around the globe for health as well as beauty-care. Many plant-based medicines are known to be economic and are found to be free from side effects. In India, plant based indigenous knowledge and traditional medicines are being used in various cultures and tribes. The tribal healers inhabiting different remote pockets of India are the real powerhouse of such knowledge. They perform several healing practices in order to cure various health disorders. Shankhapushpi, an Ayurvedic herb is known as a brain tonic.

Now days there are many products (brain tonics) available in the market. Medhya Rasayana drugs enhance the function of Smriti, decreases the Rajas and Tamas and provides better functions of Manasa (Amin, Vyas, Harisha, Shukla, 2011). Ayurveda claims that several plants, the "Medhya" plants (intellect promoting) herbs such as, Convolvulus microphyllus (C. pluricaulis), Centella asiatica, Bacopa monnieri, Acorus calamus, Zingiber officinale
and Celastrus paniculatus are beneficial in cognitive disorders (Joshi and Parle, 2006). Shankhpushpi is one of the traditional ethnomedicines used in Ayurvedic medicine in India as a controversial source of Shankhpushpi for various brain related disorders. Convolvulus pluricaulis has been widely used in Ayurvedic medicine to treat nervous disorders, similar to the use of kava kava (piper methysticum) and valerian (valeriana officinalis) is prescribed by American herbalists (Husain, 2007). For this study a single drug Shankhpushpi was selected.

**SHANKHPUSHPI**

India is full of rues and roses.

Here is a rue with white flowers.

O Man! You take this medhya inside.

It will enhance thy memory and intellect.

Shankhpushpi is a Sanskrit word meaning ‘the plant with flowers shaped like a conch’. The conch or Shankha is one of Lord Shiva’s sacred instruments often used in ritual worship.

Acharya Charaka said that Shankhpushpi is best among the medhya rasayanas (Charaka Samahita, 1949). According to traditional system of medicine, Shankhpushpi is considered as a promoter of life span, strength and intellect. It cures mental disorders like Insomnia, hysteria, Insanity, high blood pressure, and depression (Brahmvarchas, 1999).

Rasayanas are ayurvedic preparations that promote resistance against infections and others diseases by maintaining equilibrium of Vatta, Pitta and Kapha. They improve memory, intelligence and promote youthfulness and efficacy (Sharma, 1965; Taranalli, 2000; Adams, Gmunder, and Hamburger, 2007; Bala, and Manyam, 1999; MHFW, 2001; Gupta, Tandon, Sharma, 2005; Kapse, and Nesari, 2005). Shankhpushpi is mainly used as a rasayana which is mainly advocated for use in rejuvenation therapy. A rasayana is one which promotes longevity and prevents diseases by providing strength and immunity. It produces a feeling of peace and calm, reduces stress, anxiety and mental fatigue.
Shankhapushpi has been considered as the best Medhya Rasayana in Charak Samhita, Susruta Samhita, Astanga Sangrah, Astang Harida, Bhavprakash Nighantu, Nighantu Aadarsh, Kaidele Nighantu, Dravyaguna Vigham, and other popular books of Ayurveda.

Traditionally, the leaves of Shankhpushpi were used to treat chronic bronchitis and asthma. The root was used for childhood fever, and the oil stimulates the growth of hair. The whole herb was used medically in the form of a decoction with cumin and milk in fever, nervous debility, and loss of memory, syphilis and scrofula.

Shankhpushpi is an astringent, rejuvenating, hot aphrodisiac and a nervine tonic. It improves strength, immunity, digestive power, complexion and voice and cures intestinal worms, animal poisoning, skin disease, cough, dyspnea, diabetes, dysuria and uterine disorder. It is helpful in epilepsy, insomnia, heart disease and hometemesis, hypertension, mental as well as physical fatigue (Chunekar, 1982; Sharma, 1983; Kulkarni, 1999; Singh and Mehta, 1977; Handa, 1994; Singh, Narsimhamurthy and Singh, 2008). It is also used to treat anxiety and Stress disorders (Kulkarni, 1999; Singh and Mehta, 1977). In Gonda Uttar Pradesh, India, the leaves are recommended for depression and mental disturbance (Singh, 1996). The Shankhpushpi has been found to be effective in reducing different types of stress including psychological, chemical and traumatic (Prasad, Gupta, Srivastava, Tandon, Wahi, and Udupa, 1974).

The Ayurvedic system of medicine advocates its use as a brain tonic. The drug exhibited anti-anxiety and memory enhancing effects and relieved the symptoms like nervousness, palpitation, insomnia, weakness, fatigue and dyspepsia (Singh and Mehta, 1977). Dietary feeding of this plant increased protein synthesis of the hippocampus, thus enhancing memory and learning in experimental animals (Sinha, Dixit, Madnawat, Sharma, 1989). It showed reduction in the level of plasma cortisol and urinary catecholamines (Shukla, 1981). The ethanolic and methanolic extracts of the whole plant reduced spontaneous motor activity, potentiated pentobarbitone hypnosis and morphine analgesia, reduced fighting response, abolished the conditioned avoidance response, antagonized convulsive seizures and tremorine induced tremors in mice (Pawar, Dhuley, Naik, 2001; Sharma, Barar, Khanna, Mahawar, 1965). Alcoholic extract of Convolvulus pluricaulis possessed antifungal activity (Gupta and Mudgal, 1974). The juice of whole plant prevents excessive menstruation. The fine paste made by grinding the plant is
helpful to cure abscess (Singh and Panda, 2005). Ethanolic extract of whole plant when administred to cholesterol fed gerbils, reduced serum cholesterol, LDL cholesterol, triglycerides and phospholipids significantly after 90 days (Chaturvedi, Mali and Dixit, 1997). The root extract of this plant regulated hyperthyroidism in female mice (Panda and Kar, 2001). The juice of fresh whole plant of Convolvulus pluricaulis possessed anti-ulcerogenic effect and is comparable to sucralfate (Sairam, Rao and Goel, 2001). Ethanolic extract of the entire plant exerted a negative inotropic action on amphibian and mammalian myocardium. It also exerted spasmolytic activity on smooth muscles (Barar and Sharma, 1966). The Shankhpushpi gives effective relief in symptoms of behaviour disorders (Kapse, and Nesari, 2005).

It is also used as the best herb for beauty, stating that it achieves the goal of beauty, which is auspicious in all parts of the body. It also helps to nourish all layers of the skin (Twachya effect). It enhances all three pillars of Ayurvedic beauty, known as outer beauty, inner beauty, and lasting beauty. Shankhpushpi enhances the quality of bone marrow and nerve tissue (Majju Dhatu).

Marketed samples of memory booster tonic Shankhpushpi from different manufacturers have different Shankhpushpi sources. Himalayan drug company’s brand ‘Mentat’ contains Evolvulus alsinoides as a source of Shankhpushpi whereas ‘Brainokan’ of Kangra Herbs contains Convolvulus pluricaulis as a source of Shankhpushpi. Similarly ‘Medhavati’ of Patanjali ayurveda contains Convolvulus pluricaulis as a source of Shankhpushpi besides other ingredients (Kothiyal and Rawat, 2011). Many formulations, such as “Abhrak bhasma”, “Brahmi ghrita”, “Brahmi vati”, “Brahm rasayan”, “Dimagheen”, “Manasmrita gutika”, “Mukta vati”, Memorex tablets, Stress guard capsules and “Shankhpushpi syrup” containing shankhpushpi as a single drug or in combination with other drugs are available in the Indian market and shankhpushpi is routinely advertised for memory enhancement in the print and electronic media in India. Herbalists believe that Shankhpushpi calms the nerves by regulating the body’s production of the stress hormones, adrenaline and cortical (Kumar, 2006).

Handa and Kapoor (1998) noted that the alkaloid shankhpushpiane as a main chemical constituent of this plant. They reported that the fresh juice of Shankhpushpi is used nerve
tonic in case of epilepsy, insanity and nervous debility. It is found that there is no side effect of Shankhpushpi even used for longer durations (Priyanka and Batra, 2004, Dubey, Pathak and Gupta, 1994).

Several clinical trials suggest that acetyl-L-carnitine and phosphatidylserine delays the onset of age related cognitive decline and improve overall cognitive function in the elderly subjects (Salvioli, 1994 and Maggioni, Picotti, and Bondiolotti, 1990). The hormone metalonin is a potent antioxidant that regulates the body’s function and enhances cognitive performance (Magri and Sarra, 2004; and Peck, Leaoff, Ahmed and Aoebert, 2004). The most widespread application of Shankhpushpi is for mental problems, but they have been considered for an array of other human maladies (Sethiya, Trivedi, Patel, and Mishra, 2010). Rajagopalan (1995) reported the effect of Ayushman-8 (containing Shankhpushpi, Brahmi, and Vacha) on Manasa-mandata (mental-retardation).

Lastly if the relationship between the shankhapushpi and cognition is discussed then it can say that some experiments or trials showed that there is a positive relationship between Shankhapushpi and Cognition. In a study, after administration of Shankhapushpi it was found that Convolvulus Pluricaulis showed significant results of its cognition enhancing (Medhya) and manasarogahar activity (Kapse, 2005). It was also found that Shankhapushpi enhanced memory and cognitive functions such as attention, storage, retrieval capacity of STM and LTM, and speed of learning (Priyanka and Batra, 2004). And many of the studies showed the similar findings. So there is a need to find that is it really exist or not?