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Evaluation of Anti Stress Effects of *Nardostachys Jatamansi Dc* Root Extract On Clinical Patients: A Psycological Estimation

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Abstract

Nardostachys Jatamansi DC is a reputed ayurvedic herb and has been used in various formulations. It is an effective drug and used in the treatment of many diseases. The anti-stress properties of *Nardostachys jatamansi* extract were studied on male and female registered patients of approximately similar age groups, for cognitive disorders at local ayurvedic hospital. Volunteers were grouped according to their age, sex and educational status (including both illiterate and literate). These patient were divided into Control (C1) Stress group (E1), Dose group (E2) and Stress +Dose group (E3) and were subjected to memory retention and recall test. Student t' test was used to analyze the results. The study demonstrated that *N.jatamansi* root extract showed its anti-stress effect on drug treated volunteers as compared to stressed. This study was conducted to understand the mechanism of *Nardostachys jatamansi DC* in protection on loss of memory and cognition deficit.

Keywords: *Nardostachys jatamansi* | Nervine tonic | clinical study | brain monoamines

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Introduction

Human body and its psychological personality depend upon the various behavioural patterns. Composite parameters of evaluating personality, such as memory retention, also include hyperactivity, short attention span, impulsive and explosive behaviour, erratic task performance and poor social adjustments, lack of concentration etc. are very important variables for a developed personality. Memory is a cognitive process involving collection, analysis, encoding, storage and retrieval of information as and when required (Kaplan and Sadock, 1995). The key role Played by hippocampus in memory functions has been well documented in the past

(Rawlins, 1985; Squire, 1987 and Sutherland and Rodriguez, 1989).

A reduction in the hippocampal volume and cell numbers has been reported in animal models of aging, depression, and alcoholism—conditions that have all been associated with memory loss in humans(Heine *et al*., 2004; Herrera *et al*., 2003).Chronic stress is associated with hippocampus-dependent learning and memory impairments have been reported in animals subjected to 6 h of physical restraint each day for 21 days(Sunanda, *et al*., 2000). Behavioral deficits in animal models of chronic stress have been associated with loss of hippocampal neurons, dendritic atrophy, and increase in dendritic spines and excrescences (Sunanda, *et al*., 1995; Uno *et al*., 1989) and Such models therefore provide an useful approach to study the pharmacological potential of agents in preventing/reversing stress-related cognitive impairments.

In Ayurveda there are so many drugs that are used as memory and intelligence enhancers. Some of them are as Guduchi (*Tinospora cordifolia*), Jyothishmati (*Celastrus panniculata*), Shankhapushpi (*Evolvulus alsenoids*), Brahmi (*Baccopa monniera*), Ashwagandha (*Withania somnifera*).

The plant *Nardostachys jatamansi DC* of family Valerianaceae is a well-known plant in the Indian traditional medicinal system and has historically been used in Ayurveda as Medhya (Brain tonic), Rasayana (Rejuvenative to the mind), Nidrajnana (Promotes sleep) and Manasrogaghna (Alleviates mental diseases) (Pandey, 1991; Sharma *et al*., 2001). *N. jatamansi DC* quickly relieves from psychosis, maniac psychosis, syncope and hysteria (Hamied *et al*., 1962), antiparkinsonism (Ahmad *et al*., 2006), it improves memory and reduces forgetfulness. It acts as memory restorative agent in people with memory loss. (Vinutha, 2007; Joshi and Parle, 2006) and antidepressant (Habibur Rahman and Muralidharan, 2010). Neuropharmacological profile of jatamansone was studied by Arora, (1965b), which is the active ingredient of Nardostachys jatamansi, reduced aggressiveness, restlessness. Children with marked mental retardation showed corresponding improvement in I.Q. were also noted (Gupta and Virmani 1968). Habibur Rahman *et al.* (2010) have also concluded that methanolic extract of *N. jatamansi DC* possesses protective activity from the loss of memory and cognition deficits. Karkada *et al.* (2012) also described efficacy of *Nardostachys jatamansi* in the prevention of stress induced memory deficit. Although these studies give significant results that *N.jatamansi* work as nervine tonic and have memory enhancing properties but there is no evidence of human testing. This study was conducted to understand the mechanism of *Nardostachys jatamansi DC* in protection on loss of memory and cognition deficit clinically.

Material and Methods

The study was conducted on 16 clinical out patients for known stress related disorders such as proved and known cases of cognitive disorders, depression etc, at local Ayurveda hospital with prior permission of the authorities. For control studies, a group of fifteen persons were selected by a pre-test for the study and as per practitioner's selection. Healthy persons of both sexes and similar age group were allowed to volunteer for the study.

Both control and patient volunteers were explained related aspects of drug and test to be conducted without explaining them the real purpose of the tests prior to start of the experiment. Test was conducted everyday between 10 AM to 12 PM after one hour of drug intake in all the four groups. Drug (N Jatamansi) was given as per ayurvedic practitioner's prescription depending on the patient's condition. Persons of both sexes were separately divided into Control (C1), Diseased persons (stress group; E1), only Dose group (E2) and Diseased persons supplemented with dose (Stress + Dose group, E3). Volunteers were grouped according to their age, sex and educational status (including both literate and illiterate). In each group at least five volunteers selected were illiterate.

Tests were designed keeping the educational status of the volunteers with the help of Department of Psychology, M.L.S. University, Udaipur. Literate persons in all groups were given test papers in Hindi or English language according to their preference. Illiterate persons in all groups were given pictures of articles, animals, birds, and specific scenes for testing memory status. English and Hindi word list including nouns were taken from paper of Yuile and Madigan, (1969).

Mode of Test

Each volunteer in all control and experimental groups was given a list of 20 words and made to read aloud for 30 seconds one by one. The person recalled these words in 1-minute time period. Numbers of words recalled were noted. After each trial a set of 10-15 words or pictures were given as distracters, to avoid learning word list. 5 trials were made to find out the effect of repetition on long-term retention. Percent value of word recall is calculated for each person and each trial. Mean value, standard deviation, standard error of mean was calculated for all groups in both sexes. **Student't'** test was used to find out the significance of the results. All values are represented Mean ± SEM (N = 4).

Group	Male	Female
Control	77 ± 8.16	84 ± 7.40
Stressor Diseased (E1)	43 ± 4.18 +++	45 ± 3.14 +++
Only Dose (E2)		
1st Week	72 ± 4.73 ***	75 ± 4.54 ***
2nd Week	72 ± 5.83 ***	80 ± 4.78 ***
3rd Week	78 ± 7.27 ***	80 ± 3.16 **
Stress or Disease + Dose (E3)		
1st Week	53 ± 3.87	49± 4.10
2nd Week	58 ± 3.74	57 ± 3.46
3rd Week	67 ± 4.42 ***	66 ± 6.05 ***

Results

In control group, 4 volunteers of both sexes were taken of near about same age groups. In 1st trail 50-60 % word recall was observed. In 2nd to 5th trial word recall percentage increased gradually. First Trial in Males word list recall was 50% it increased with increased number of trails. In both male and female word list recall was increased with each successes trail.

In stressed or diseased group E1, Patient suffering from varied disease and other psychosocial stress related disorders including epilepsy and depression. The word recall was significant less ($P < 0.05$ in male and $P<0.05$ in Female) as Compared to Control group.

In E2 or only dose group the effect of drug extract was evaluated to find out any discrepancies due to drug intake. The observed values suggest that after every week of drug intake word recall values were found to be significant in both male and female as compared to stressed male and female.

In stress or disease + dose group (E3) same patients were tested for the word list recall for 3 weeks. Analysis of the word recall percentage for all the three weeks was done. This observation showed that after first and second week of drug intake both male and female groups did not show any significant increase in word recall, but after third day of drug intake both male and female showed significant increase (P<. 05) in memory level as compared to stressed group. **Data are summarized in figure 1-3.**

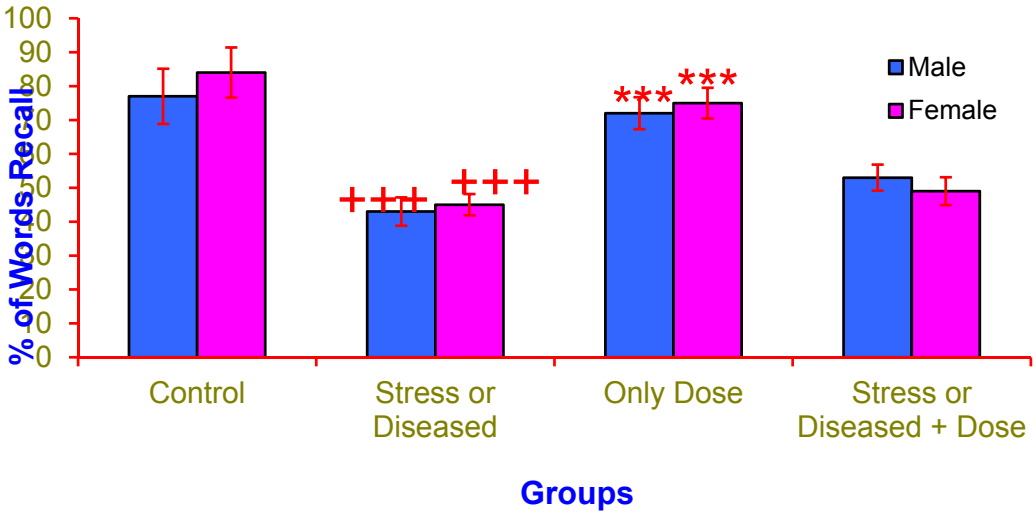

FIGURE 1: Effect of various treatments on word recall percentage after **1st week**. Values are expressed as mean ±SEM and significance is obtained from student t-test showing p<0.01=++; p<0.05=+++ as compared to stress; p<0.01=**;p<0.05=*** as compared to stress group.

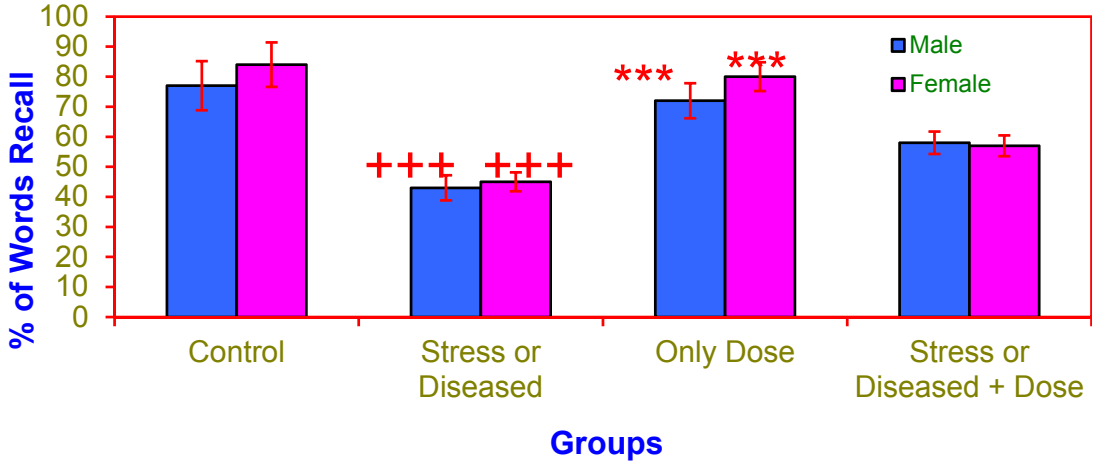

FIGURE 2: Effect of various treatments on word recall percentage after **2nd week**. Values are expressed as mean ±SEM and significance is obtained from student t-test showing p<0.01=++;p<0.05=+++ as compared to stress;p<0.01=**;p<0.05=*** as compared to stress group.

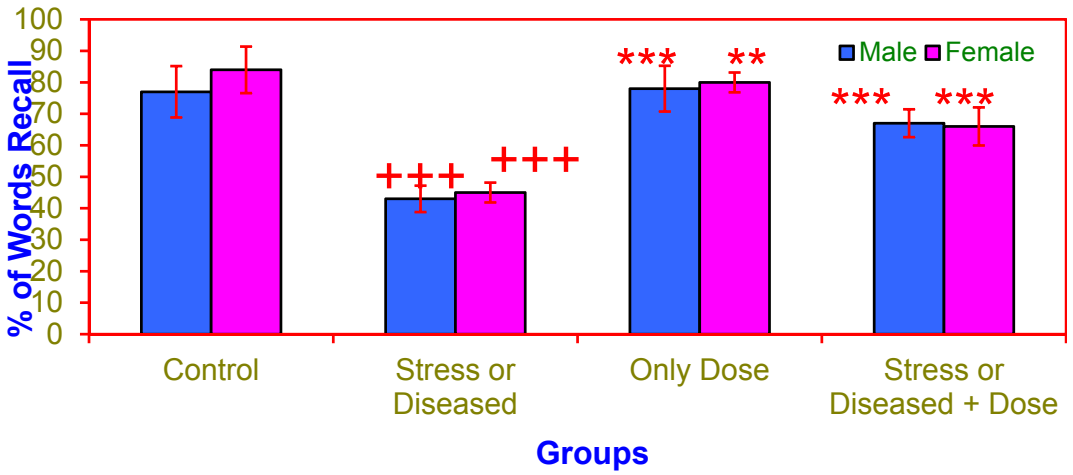

FIGURE 3: Effect of various treatments on word recall percentage after **3rd week**. Values are expressed as mean ±SEM and significance is obtained from student t-test showing p<0.01=++; p<0.05=+++ as compared to stress; p<0.01=**;p<0.05=*** as compared to stress group.

Discussion

Clinical study in patients clearly demonstrates neuroprotective effects of *Nardostachys jatamansi* root extract. Study performed in patients under strict control of a ayurvedic physician has also shown significant improvement in retention and recall of the memory after treatment with the drug extract. This inference is based on significant changes observed i.e., gradual increase in score of the drug treated diseased as compared to only diseased and control volunteers from first week to third week of the treatment with the extract. Results of the study thus suggest that *N.Jatamansi* root extract could be an alternative treatment for cognitive disturbances.

This study first time describes the influence *of Nardostachys jatamansi* root extract on a subjective trial in human volunteers suffering from various cognitive disorders such as memory deficit and memory disturbances. Stress influences cognition in both animals and humans is well established. One of the symptoms of stress is release of glucocorticoids (GC's; Corticosterone in rats, Cortisol in humans). Study in rodents has revealed that GCs enhance or impairs performance dependent on the specific memory type tested and on the timing of the stress exposure, respectively (Diamond *et al*., 1996; Lupien and McEwen, 1997; de Quervain *et al*., 1998; De Kloet *et al*., 1999; Roozendaal, 2000). Experimental studies in humans have repeatedly shown that GC administration can interfere with performance in working memory as well as declarative memory tasks, (Newcomer *et al*., 1999; Wolf *et al*., 2001) and delayed recall of declarative material (De Quervain *et al*., 2000). Memory impairing effects have been also observed in young and elderly subjects after exposure to psychosocial laboratory stressors (de Quervain *et al*., 1998; Kirschbaum *et al*., 1996; Wolf *et al*., 1999). Prolonged treatment (several days) seems to be needed in order for declarative learning deficits to occur (Young *et al*., 1999; Wood and Shors, 1998). Gender plays an important role in the effects on cognition (Carlson and Sherwin, 1999).

Other than GCs, stress decreases the level of certain chemicals such as brain monoamines (serotonin, norepinephrine, dopamine

noradrenaline, catecholamine, and GABA). Scientific studies have found that N.jatamansi increases the cerebral levels of GABA (GAMMA-AMINOBUTYRIC ACID). *N. Jatamansi* is likely to reduce depression by increasing the levels of monoamines in the brain (Dhingra and Goyal, 2008). In their study Prabhu V *et al*., (1994) also Studied the effect of acute and sub chronic administration of alcoholic extract of the roots of *N. jatamansi DC* on nor epinephrine (NE), dopamine (DA), serotonin (5-HT), 5hydroxyindoleacetic acid (5-HIAA), gamma-amino butyric acid (GABA) on male albino Wistar rats. A significant increase in the level of GABA was observed in the drug-treated groups when compared to the controls. A 15-day treatment resulted in a significant increase in the levels of NE, DA, 5-HT, 5-HIAA, and GABA. Jai Prakash and Md Nazmul (2015) also demonstrated that probably the active ingredients Jatamansone from *Nardostachys jatamansi* regulates the metabolic degradation of serotonin, norepinephrine, dopamine and other endogenous amines in CNS through interaction with GABA ergic receptors and help to increase their level.

These data indicate that alcoholic extract of the roots of *Nardostachys jatamansi* causes an overall increase in the levels of central monoamines. In the present study it was also observed that the females show less effect of stress on short term memory than males.

Conclusion

From the above results of the present study, it is concluded that *Nardostachys Jatamansi* act as nervine tonic, its de-stressing effects stimulates the healthy nervine functions and help combating cognitive performance, learning, memory and other age related neurodegenerative disorders.

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