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A Studies On Centrally Acting Medicinal Plants For Stress Disorder

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ABSTRACT

Plant drugs have a long history in both traditional and modern societies as crude drugs. The plant drugs have been extensively practiced as traditional medicine since centuries by peoples of almost all countries of the world. The medicinal plants are considered to be the almost exclusive source of primary health care as well as a source of pharmacological active compounds for 80 % of the world's population, herbal medicines have been proven effective in common as well as rare diseases. Bacopa monnieri belongs to the family Scrophulariaceae is perennial, creeping herb, origin to wetlands of southern and eastern India, Australia, Europe, Asia, north and South America. The major therapeutic chemical constituents of this plant identified through various researches are the Triterpenoids, Saponins, Bacoside, Flavonoids and Glycosides. Bacoside A has been recognized as the chief component responsible for therapeutic effects. The plant is used in traditional Ayurvedic treatment for a range of CNS applications, being considered as a memory tonic. It has been found to possess various CNS actions including nootropic, antidepressant and anxiolytic action. It is also considered to be an important adaptogen. This review shall cover pharmacological properties, chemical constituents and scientific researches supporting not only traditional use of Ayurvedic claims but also other physiological conditions such as anti-inflammatory, cardio tonic and other pharmacological effects of B. monnieri extracts.

Keywords: Pharmacological activities, Scrophulariaceae, Bacopa monnieri, Traditional uses, Phytomedicines.

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INTRODUCTION

In human culture from days immemorial medicinal plants have assumed a significant function in the avoidance and control of ailments. It has been affirmed by WHO that natural medicines serve the wellbeing needs of around 80 % of the world's population particularly for many individuals in the rural areas of developing countries. Advancement of science and innovation and the adverse reaction of current medication have brought about expanded and viable use of plant-based drugs. Attention to therapeutic plants utilization is a consequence of the numerous long stretches of battles against sicknesses because of which man figured out how to seek medications in barks, seeds, natural product bodies, and different plant species. India has a rich heritage of traditional medicine and traditional health care systems. Bacopa monnieri (L.) is a significant medicinal plant of the family Scrophulariaceae used in traditional medicine to treat various CNS disorders and for promoting memory and intellect. It is known as a memory enhancer, and many preparations are now commercially available in the market [1]. Most trauma patients, given a little time, return to normal. Some individuals, however, may have stress responses that are not going away on their own, or may even get worse over time such people can develop SD. Three different kinds of symptoms are encountered by people with SD. The first set of symptoms includes a form of reliving the trauma, such as being frustrated when faced with a painful memory or worrying about the trauma. The second group of symptoms include either staying away from places or reminding people of the trauma, being separated from other persons, or feeling numb. The third set of symptoms involves things like feeling on guard, being irritable, or being quickly startled. In addition to the symptoms mentioned above, the fact that people with SD also experience other conditions such as depression, drug abuse, memory and cognition issues, and other physical and mental health problems complicates SD. Such problems can lead to impairment of the ability of the individual to function in social or family life, including job instability, marital problems, and family problems [2].

PHARMACOLOGICAL STUDIES:

1. Antidepressant and Anti-antianxiety activity
2. Sedative and tranquillizing properties
3. Antihypertensive activity

Antidepressant and Anti-antianxiety activity

In an earlier review, the antidepressant potential of Bacopa monnieri was tested where it showed a significant antidepressant efficacy in the most widely used behavior paradigms in animal depression models, including forced swim test and learned helplessness tests. In all the test

parameters in the rat model of clinical anxiety, Bacopa extract demonstrated a dose-related anxiolytic efficacy qualitatively comparable to that of Lorazepam [3].

Sedative and tranquillizing properties

Several studies reported a sedative effect of glycosides named hersaponins [4]. A subsequent research showed that the alcoholic extract and, to a lesser extent, the entire plant extract had tranquillizing effects on albino rats and dogs [5]. On the other hand, the plant alcoholic extract and chlorpromazine have been found to enhance the efficiency of rats in motor learning. A previous study stated that in promoting the acquisition and retention of brightness discrimination reaction, a single dose of glycoside Hersaponin is better than pentobarbitone [6].

Antihypertensive activity

With additional actions on vascular smooth muscle Ca2 + homeostasis, Bacopa monnieri decreases blood pressure partially through the release of nitric oxide from the endothelium [7]. A clear, prompt and constant anti-hypertensive action of Bacopa as effective as the clinically used captopril has been observed [7]. Via the improvement of coronary blood supply, contractile force and a reduction in infarct rate, Bacopa monnieri enhances myocardial function following ischemia / reperfusion injury [7]. This extract or an active ingredient can thus contribute to an efficient and novel treatment for primary human hypertension.

B. monnieri has been found to possess significant cognition and neuropharmacological, antidepressant activity, antianxiety, sedative, tranquilizing, anticonvulsant, anticancer, anti-inflammatory, antioxidant, antibacterial, antifungal, antiulcer, antidiarrheal, antihypertensive, analgesic and anti- toxicity activities.

PHYTOCHEMICAL CONSTITUENTS

In view of the importance of this plant in the indigenous medicine system, several groups of researchers have performed systematic chemical analyses of the plant. Bose and Bose reported the isolation of the B. monneria alkaloid brahmine in 1931. The alkaloids are nicotinine and herpestine. It contains D-mannitol and a saponin, hersaponin and potassium salts [10, 11]. The3-(alpha-L-arabinopyranosyl)-O-β-D-glucopyranoside-10,20-dihydroxy-16-keto-dammar-24-ene was assigned as Bacosides A, is the key chemical agent shown to be responsible for the memory-facilitating activity of B. monniera [12]. Bacopa saponins A, B and C are isolated and identified as 3-O-alpha-L-arabinopyranosyl-20-O-alpha-L-arabinopyrasonyl jujubogenin,3-O-[alpha-L-binofuranosyl-(1→2)-alpha-L- arabinopyranosyl] pseudojujubogenin and 3-O-β-D-glucopyranosyl-(1→3)-{alpha-L-arabinopyranosyl- (1→2)}-alpha-Larabinopyrasonyl] pseudojujubogenin respectively by spectroscopic and chemical transformation methods [13]. They

also reported the new dammarane-type pseudojujubogenin glycoside, bacopasaponin D, defined as 3-O-[α-L-arabinofuranosyl- (1→2)-β-D-glucopiranosyl] pseudojujubogenin by spectroscopic and chemical transformation methods. Two new pseudojujubogenin glycosides reported as bacopasides I and bacopasides II from the methanol extracts [14]. In addition, the glycosidic fraction of B. monniera was isolated from three new phenylethnoid glycosides, called monnierasides B [15]. Three new saponin have been isolated from the B. monniera designated as bacopasides III, IV, V with structures 3-O- α-L-rabinofuranosyl-(1→2)-β-D-glucopyranosyljujubog enin,3-O-β-D-lucopyranosyl-(1→3)-α-L-arabinopyrano- syl jujubogenin, 3-O- β-D-glucopyranosyl-(1→3)-α-L-arabinofuranosyl pseudojujubogenin. Phenylethanoid glycosides, flavonoids, amino acids such as alpha-alanine, aspartic acid, glutamic acid, betulinic acid, stigmasterol, b-sitosterol and stigmastenol are other significant compounds identified in this plant [16, 17].

PLANT PROFILE

Bacopa Monnieri

Plant description

Name of the plant: Bacopa monnieri

Botanical name: Bacopa monnieri (L.) Wettst.

Family: Scrophulariaceae

Name in different languages

- English: Water Hyssop, Thyme leaved gratio Hindi: Brahmi, Jalnim, Barambhi
- Marathi: Nirbrahmi
- Sanskrit: Aindri, Brahmi, Gundala, Indravalli, Jalasa Tamil: Nirpirami, Piramiyepundu, Vivitamcampirani
- Telugu :Sambrani Chettu, Neeri Sambrani mokka, sambraani aaku Malayalam: Brami, Nirbrahmi

Figure 1: Image of Bacopa Monnieri

MATERIALS AND METHOD

The following materials and methods were used to achieve and realize the aims and objectives of this study

Experimental animals

Swiss albino mice, male or female (body weight 20-25 grams) 8 for the study Only ~10 weeks old animals were used and were collected from the animal house of the Department of Pharmacology, Vidyabharati College of Pharmacy, Amravati. All animals were acclimated in the animal room before use. Animals were housed at moderate temperature (25 ± 1 °C) and 50 ± 55% humidity on a 12-hr day night cycle and fed standard rat chow and water ad libitum. Experimental procedures were approved by the Animal Ethics Committee (Registration No. 1504/ PO/Re/S/11/CPCSEA) and the care of animals in the experiments was carried out in accordance with the instructions of the Ministry of Environment CPCSEA.

Drugs and drugs

Standard drugs used are diazepam (Laborate Pharmaceuticals India Ltd, H.P) and fluoxetine (Ange l Pharmaceuticals, Nagpur, MS) dissolved in saline and diluted with saline to obtain required concentrations. HEBM extracts were dissolved in saline and prepared fresh. The extract is taken or orally. and intraperitoneal injection of standard drug or vehicle. From the 2nd to the 21st, there is a introduction to key concepts and tests once a day for 30 minutes before each test.

Preparation of plant extracts

All parts of the plant are ground into powder and extracted by the maceration extraction method. The new sample is air dried and ground to 1500 g of powder. Dried leaf powder (500g) was degreased with petroleum ether alone (40-60°C) for 6 hours. It was then filtered, the pulp dried and extracted with a mixture of ethanol (700ml): water (300ml) (70:30) by weight for 24 hours at room temperature. Stir the mixture regularly during this time. The results were filtered through muslin

and then filtered into Whatmann No. Filtered using a rotary vacuum cleaner (40°C) using 1. 1 piece of filter paper be careful not to turn the extract into powder. The extraction was repeated twice and the filtered hydroethanol was combined and evaporated under reduced pressure.Dissolve 50 g of hydroalcoholic extract in 200 ml methanol/water (7:3). The solvent was evaporated and dried to constant weight in a field evaporator and stored at −10°C until used in the experiment [23]

Induction of electric foot injury

On days 0 and 1, place mice in a plexiglass chamber (300 × 300 × 350 mm) by placing the animals on a loaded stainless metal bar grid floor (4 mm diameter and 9 mm). mm interval) electric foot shock for 2 days. After 5 min, a total of 15 intermittent footshocks (intensity: 0.8 mA, duration: 10 s, delay: 10 s) were delivered to the target floor from a separate generator. This is followed by 3 weeks, days 2, 7 and 14, and repetitions are made in the same place (as a reminder) for 5 minutes without shock. [Twenty four]. Animals were divided into 6 groups: no stress, stress control group (Stre control), Bacopa monnieri (50, 100 and 200 mg/kg), diazepam (1 mg/kg) and fluoxetine (15 mg/kg) administered group. Group (n = 6 in each group).

Behavioral Assessment of Post-Stress Stress

on 21st days, 24th at the end of the protocol, animals were tested for different behaviors, including increased plus more for research and open testing. Clean each instrument with alcohol and water after each test. Record and analyze behavior in behavioral assessment tools. Behavioral freezing in response to weekly reminders was assessed on days 2, 7, and 14 after stress exposure.

Freezing behavior

All animals were exposed to the stimulation condition, for example, in the same room as the foot. A shock was given, but no foot shock was given for another 5 minutes on days 2, 7, and 14, respectively. The freezing time of the mice's behavior was recorded on days 2, 7, and 14. Freezing was defined as the absence of movement other than breathing. Total number of seconds spent freezing while each measurement was measured and scored [25].

Elevated Plus-Maze

On the 21st day after the foot shock increased the searches made. The additional support apparatus was made of Plexiglas and consisted of two open arms (30x5 cm) and two closed arms (30x5 cm) with a wall length of 25 cm. The arms are spread out on a central platform (5 × 5 cm). The bush is 50 cm above the ground. Each animal was placed in the center of the probe, facing one of the close d arms. The number of entries in 5 minutes and the time spent closing and opening the handle were recorded. Arm crawling is defined as the animal placing all four paws on the arm. All search

activity (number of entries) is recorded. After each test, the stone was carefully cleaned with cotton soaked in 10% ethanol solution [26].

Open Area

Open the test area on the 24th day after foot impact. This method is used to measure the animals exploration and thinking. The open experimental equipment consisted of a square area (60cm x 60 cm x 60cm) divided into 9 areas. Place the mouse in the center of the competition area on the wall and allow the experimenter to freely explore the apparatus in front of the animal for 5 min. Walking (number of segments covered by all four paws), hindlimb posture (number of hindlimb postures of the mouse), time spent in the central chamber, and number of passages through the closed central chamber are not included. Mice were brought to the laboratory in cages and were always held by the base of their tails. After 5 min, test mice were returned to their home cages. Open areas were washed with 70% ethanol and allowed to dry between experiments [27].

RESULTS AND DISCUSSION

Freezing behavior

Discrimination results in freezing behavior increased significantly at 2, 7, and 14 days after the end of the procedure, and the results showed that the rats were reacting to the environment. With the fear response of the normal control group. Repeated administration of HEBM at doses of 50, 100 a nd 200 mg/kg resulted in a decrease in freezing behavior ($P<0.01$), ($P<0.001$). Repeated treatment with fluoxetine at a dose of 15 mg/kg significantly ($P<0.001$) reduced Catalepsy behavior. Bacopa monnieri and fluoxetine on freezing behavior in rats repeatedly exposed to Negative stimuli. Freezing behavior was determined on day 2 (A), day 7 (B), and day 14 (C).Take Bacopa monnieri and fluoxetine every day, starting from the first day of your workout. The effect of the stimulation points was clearly evident 30 minutes after treatment. All data are shown as mean ± SEM (n = 6). $\$P<0.001$ compared to vehicle control. $*P<0.01$, $**P<0.001$ compared to vehicle stress control. One way ANOVA followed by post hoc Tukey multiple comparisons.

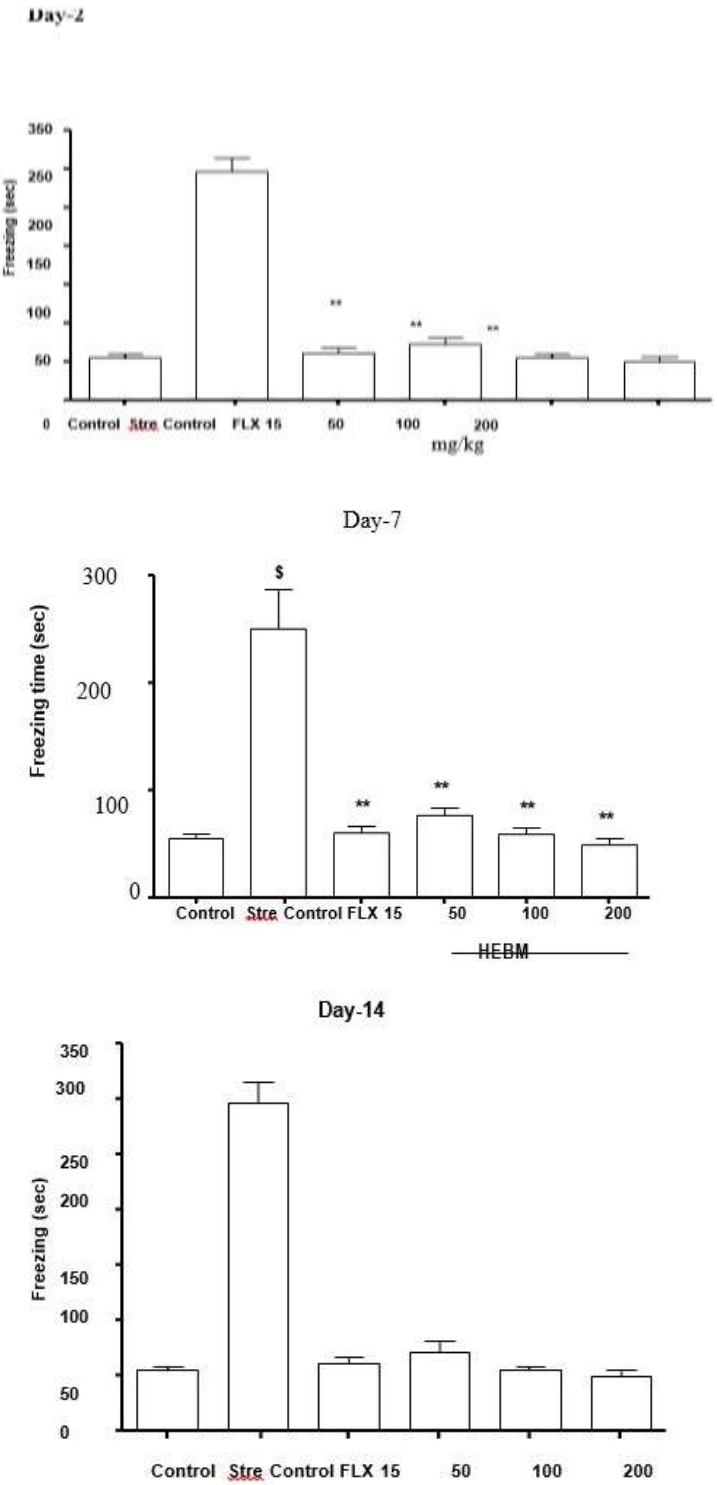


Figure 2: Freezing behavior at 2, 7, and 14 days

Elevated Plus Maze

Daily administration of HEBM (50, 100 and 200 mg/kg) for 21 days reduced shock to the foot of the elevated plus as shown in the figure photograph. In control stress in saline (Stress control) animals exposed to the aversive process, the time spent in the open arm and the number of open arm entries decreased ($P<0.001$). Repeated administration of HEBM at 50, 100, and 200 mg/kg

and diazepam at 1 mg/kg resulted in an increase in the duration and number of open arm stays ($P < 0.001$). In addition to scientific testing, the effect of Bacopa monnieri and diazepam on the increase in anxious rats. On day 21 after the aversive procedure, animals underwent a 5minute elevated plus maze test. Record the time taken to open the lever (A) and enter the open lever (B). Take bacopa monnieri and diazepam every day from the first day of training. Results of search performance were announced 30 minutes after treatment. All data are shown as mean ± SEM (n = 6). $P<0.001 compared to vehicle control. #P<0.05, **P<0.001 compared to vehicle stress control group. One-way ANOVA followed by post hoc Turkey multiple comparisons.

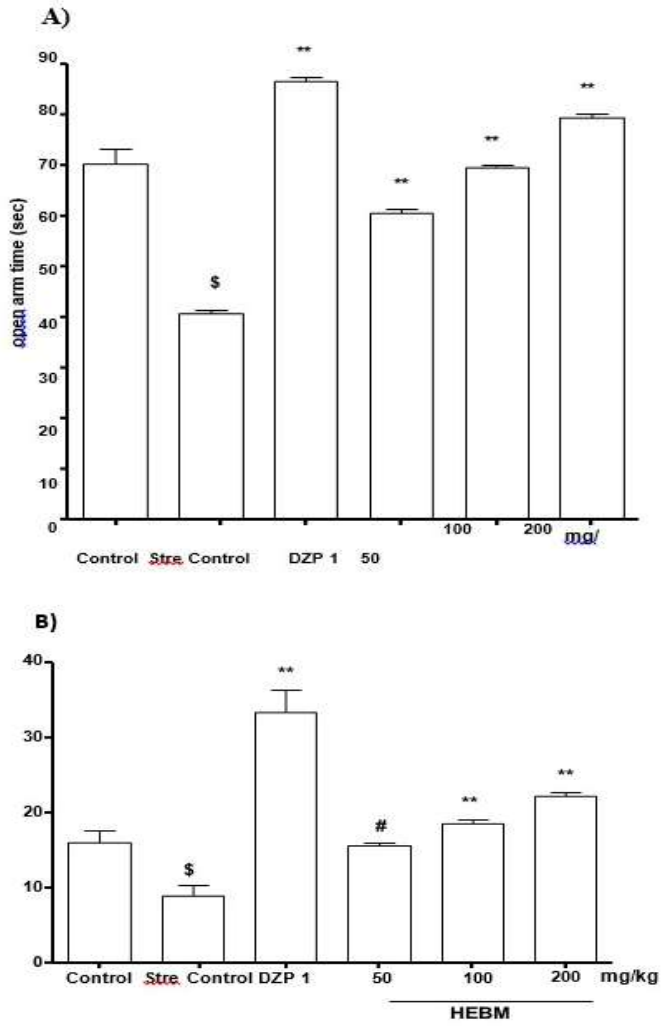
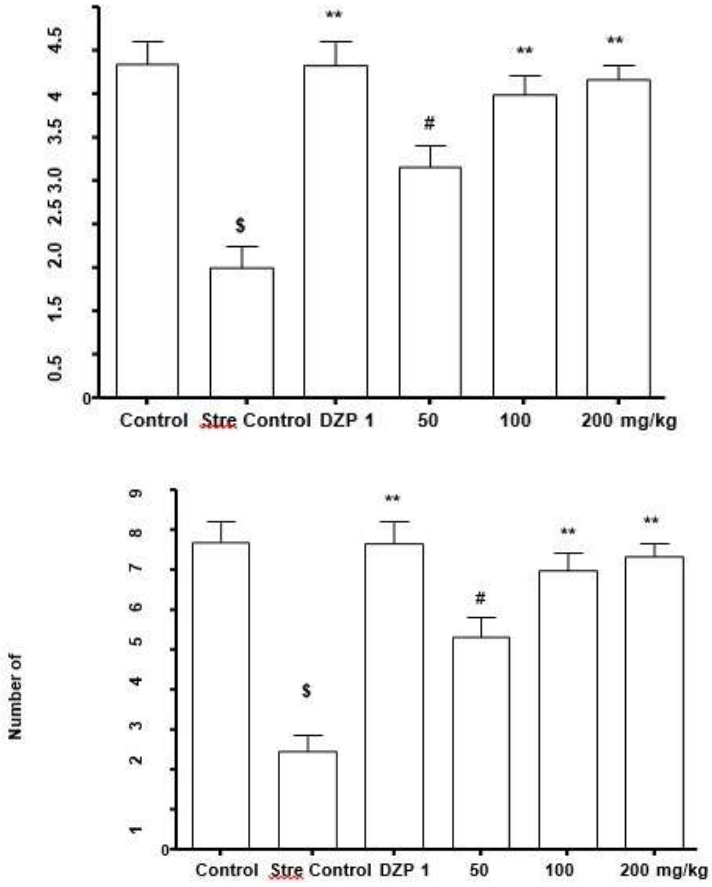


Figure 3: Time recorded to open the lever (A) and enter the open lever (B)

Open Field Test

Daily administration of HEBM (50, 100 and 200 mg/kg) for 21 days reduced foot shock in the open field test. Time spent in the central compartment, number of central squares traversed, and

rearing were reduced in saline stressed control animals receiving the aversive procedure (P<0.001). Repeated administration of HEBM at doses of 50, 100, and 200 mg/kg increased the time spent on the base, the number of passes through the square base, and the number of stances (P<0.05, P<0.01 , P<0.001). The 1 mg/kg dose of diazepam increased the time spent in the central compartment, the number of crosses of the central squares, and the number of postures compared with the control group (P<0.001). Effects of bacopa monnieri and diazepam on operant activation in stressed rats. On the 24th day after abstinence, the animals underwent a 5minute open test. Record the number of feedings (A), the number of passes through the center (B), and the time spent in the center (C). Take bacopa monnieri and diazepam every day from the first day of training. The results of the open field test are announced 30 minutes after treatment. All data are shown as mean ± SEM (n = 6). $P<0.001 compared to vehicle control. #P<0.05, *P<0.01, **P<0.001 compared to vehicle stress treatment. One method is analysis of variance based on post hoc Tukey multiple comparison s



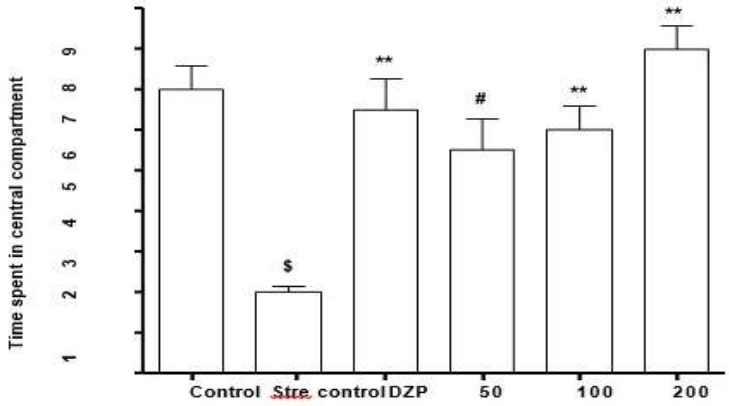


Figure 4: The number of feedings (A), the number of passes through the center (B), and the time spent in the center (C).

DISCUSSION

This study was conducted to examine the effectiveness of the hydroalcoholic extract of Bacopa monnieri leaves on post traumatic stress disorder in rats. To achieve this goal, the study used an ambulatory stress model as well as three times per week stimulation events affecting SD symptoms [28]. Different behavioral tests such as freezing behavior, incremental addition to the exploratory test, and open field test were applied to evaluate the development of SD.

In this study, the pharmacological properties of HEBM were evaluated in the SD animal model. Data show that rats developed SD like negative behaviors after administration of an aversive procedure. The data presented here show that the foot shock procedure induces SD like behavior in mice that mimics SD symptoms; These behaviors include the avoidance and anxiety that animals have: hypervigilance, aggression, and flashbacks, including sleep changes. This can lead to a long-term habit that can last up to 3 or 4 weeks and persist for a long time. These are consistent with previous findings that SD is associated with freezing and that stress arises from the shock of the foot, increasing freezing duration in word stability elements, decreasing open-arm searching at search height, and decreasing the number of strands in word stability elements. exhibitions. The center grid crosses over and takes time in the c enter. There is increasing evidence that rats receiving the foot shock procedure exhibit symptoms of increased anxiety, such as decreased fear responses to both non-injury-related and relevant stimuli. trauma, SD, similar to observations in SD patients. . in response to stimuli. Trauma-related stimuli. Studies have shown that the foot shock technique induces fear and freezing behavior may be a good test of anxiety due to dysfunctions in the brain such as the prefrontal cortex, hippocampus, and amygdala. Although foot shock produced SD-associated freezing and anxiety-

like behaviors, motor function was not affected. Data and research from open and growing sources confirm this. This finding is consistent with reports that many foot interventio ns associated with SD do not affect motor function, whereas behavioral freezing in response to the environment is associated with foot discomfort, whereas anxiety-like behavior associated with SD does

not affect motor function. Many traditionally used plants have effective medicinal properties and have great potential for clinical use in neurological disorders [29]. Bacopagnacaceae Scrophulariac eae plants were selected based on their traditional uses and rich flavonoid and saponin contents [3 0 , 31], as saponins and flavonoids have been reported to be able to mediate in the brain [32]. The reality today makes SD unknown. Research on neurobiology has shown that the pathogenesis of SD is associated with changes in various neurotransmitters and neuroendocrine systems, including serotonin (5-HT), norepinephrine (NE), and gamma-aminobutyric acid, acid A-type receptor (GABA-A). and dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis. HEBM reduces SD like behavior caused by foot shock. Data show that HEBM reduces freezing time at freezing point, increases open-arm search plus search at altitude, increases time spent in the central compartment, number of crosses of the central square, and number of rear-ups.in the field. Open trial showed that high doses of HEBM improved SD as well as fearful and stressful states. According to these results, Bacopa monnieri can increase GABA and 5HT levels and the flavonoids and saponins found in the plant should play an important role in the results obtained in this study. Since the HEBM effects we saw in this study were achieved using hydroalcoholic solution rather than isolated solution, it is important to understand the action of the components, mostly together and individually, and their interactions with other neurochemicals.

CONCLUSION:

In conclusion, the herb Bacopa monnieri can prevent SD, and serotonin and GABA may play a rol e in preventing SD caused by Bacopa monnieri. Plants may help prevent injury. Future research is needed to determine the mechanisms of action of the above tasks.

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