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ALTERNANTHERASESSILIS: A PROMISING RELIEF FROM STRESS

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ABSTRACT

According to various studies, stress is the major problem for many dangerous diseases ranging from psychiatric disorders to endocrine disorders including diabetes mellitus, hypothyroidism, peptic ulcers, male sexual dysfunction, ulcerative colitis, hypertension etc. Today's lifestyle was very frustrated due to busy schedule of even school going child up to old aged people. That is the reason medication identified with pressure and psychosis has a tremendous market on the planet. Usage of modern medicine has some benefits &results but they are mixed and unsatisfactory. Recent studies shows that the ayurvedic herbs having adaptogens which could induce the state of non-specific increase in resistance to affect internal homeostasis. The adaptogens improves the stress response and helps the body to adopt by normalizing physiological processes in times of increased stress .*Alternanthera sessilis* is one of the best phytomedicine for anti-stress activity. It is commonly known as sessile joy weed. Imbalance between the reactive oxygen species (ROS)leads to the generation of oxidative stress in our body. The anti-oxidant nature of this plant shows a promising relief from all kinds of stress. The anti-stress activity of ethanolic extract of *Alternanthera sessilis* was evaluated by using in vivo methods like forced swim test (FST), Tail suspension test(TST),Open field test (OFT),Learned vulnerability test, Gastric ulceration test. Conclusion- This study shows promising relief from stress due to the anti-oxidant nature of Alternanthera sessilis.

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INTRODUCTION

In a clinical or organic setting, Stress is a physical, mental, or passionate factor that causes real or mental strain. stresses can be outer (from the climate, mental, or social circumstances) or interior (disease, or from a clinical procedure).Stress can start the "instinctive reaction", a mind boggling response of neurologic and endocrinology systems.[1]stress is simply a reaction to a stimulus that disturbs our physical or mental equilibrium.[2]Hansselye was introduced as father of stress had made two observations, the body has a set of similar responses to a broad array of stressors & under certain conditions, the stressor will make you sick[3].A large proportion of all illness is believed to occur because of stress: because the level is too high, and/or too long term. High pressure current living is most likely the principle factor for causing ongoing disease. Fortunately, nature has a response to this test which is an interesting class of natural items called as "adaptogens".

Adaptogens has a most broad-spectrum healing property of any herbal medicines, but their unique value is that they specifically relieve stress [4].Stress is a condition of undermined homeostasis that produces diverse physiological just as obsessive changes relying upon seriousness, type and length of stress. The physiological changes associated with stress are mobilization of energy to maintain brain and muscle function; honed and centered consideration of the apparent danger, upgraded cardiovascular yield and breath. Prolonged stress plays an important role in depression and neurodegenerative disorders. Stress begins with a stimulus of external or internal origin that activates the hypothalamic–pituitary–adrenal axis (HPA) and the sympathetic nervous system (SNS).HPA and SNS activation leads to generation of glucocorticoids and catecholamine.

Recently, utilizing herbal medicines for the treatment or prevention of neurodegenerative diseases are increased enourmously.The current study is responsible for evaluating the anti-stress effect of ethanolic extract of *Alternantherasessilis* (Linn).The common name of *Alternantherasessilis* is known as sessile joyweed, found majorly in humid and warm regions of the world.[5]The extract of *Alternantherasessilis* (Linn) had reported evidence for anti-oxidant activity by using FARP and DPPH scavenging assay and shows that there is an improved superoxide dismutase and catalase activity in the livers of ovarectamised mice.[6] Hence in the present study an attempt was made to explore the possible anti-stress activity of *Alternantherasessilis*(Linn.),by keeping in mind that this plant has an anti-oxidant activity.[7]

Plant profile

*Alternantherasessilis Linn.*Is ordinarily referred to as sessile joy weed utilized as a verdant vegetable and furthermore in people and conventional arrangement of medication. The genus of this plan*Alternanthera*contains approximately 80 species,native to tropical and sub-tropical regions of Africa and Australia[8].In India 5 species has been recorded, out of which *Alternantherasessilis*(L)R.Br.ex DC and *AlternantherapungensKunth* are used widely as a raw drug sources worldwide in many traditional medicine system. *A.sessilis* Linn. is a yearly or perpetual prostate spice with a few spreading branches ,bearing short petioled straight forward leaves and little white blossoms, found all through the more sizzling piece of India, rising to the altitude of 1200m[9].

Taxonomical classification [9]

Botanical name - Alternantherasessilis (L.)R.Br.
Kingdom - plantae
Class - magnoliopsida
Order - caryophyllales
Family - Amaranthaceae
Genus - Alternanthera
Species - sessilis (L.)R.Br.

Fig.1: Leaves of *Alternantherasessilis* Linn.

Chemical constituents[10]

The herbs of this plant contains hydrocarbons,ester, and sterols like campesterol,stigmasterol,B-sitosterol, a- & B-spinasterol, palmitates of sterols.It also contains 24-methylenecycloartanol and cycloeucalenol. Its roots contain lupeol and its shoots contain protein and iron.

Edible uses[11]

- The leaves and tender tops of the plant are used for cooking
- Used in preparation of soups and salads
- It resembles spinach in flavour and appearance.

Medicinal uses [12]

- It has abortifacient,febrifuge,cholagogue and galactogogue properties
- The infusion of entire plant is used as a remedy against intestinal cramps, fever, diarrhoea and dysentery.
- The juice of this joyweed is used for the treatment of white discharge in urine
- It is also applied externally to the wounds and cuts
- The juice of the roots is used to treat dysuria, fever and bloody dysentery.
- It also has diuretic,cooling,tonic and laxative property
- It is also used for making of kajal and medicinal hair oils.
- It is very beneficial to eyes.
- It is used to cure jaundice and helped in weight loss

Types of stress:

1. Acute stress
2. Episodic acute stress
3. Chronic stress.

Stress management can be complicated because of each of the 3 different types of stress can be present as single,repeated,complicated,or chronic.Therefore,they require different levels of treatment interventions,management, and psychological treatment modalities due to the nature of the persons environment,life style,developmental history,coping resources, and personality.

Acute stress:

Acute stress is most often caused by reactive thinking. Negative thoughts predominate about situations or events that have recently occurred, or upcoming situations or events.it is also our body's immediate reaction to a new challenge, event, or demand and it triggers your fight-or-flight responses.

Example- pressures of near-miss automobile accident or arguments with family.

Episodic acute stress:

When acute stress happens frequently, it is called episodic acute stress. They are consistently in a hurry or feel compelled. These people are unendingly in the grasps of intense pressure over-burden.

Chronic stress:

It is the most harmful type of stress. On the off chance that constant pressure is left untreated throughout an extensive stretch of time, it can essentially and regularly irreversibly harm your actual wellbeing and decay your emotional well-being.

Example- long term poverty, unemployment, poor work environment.

Stress and your body [13]

Your body reacts to stress by releasing hormones. These chemicals make your mind more alarm, cause your muscles to tense, and expand your heartbeat. Temporarily, these responses are acceptable on the grounds that they can assist you with taking care of the circumstance causing pressure. This is your body's method of securing itself.At the point when you have constant pressure, your body stays ready, despite the fact that there is no danger. Overtime; this puts you in danger for medical conditions, including: High blood pressure

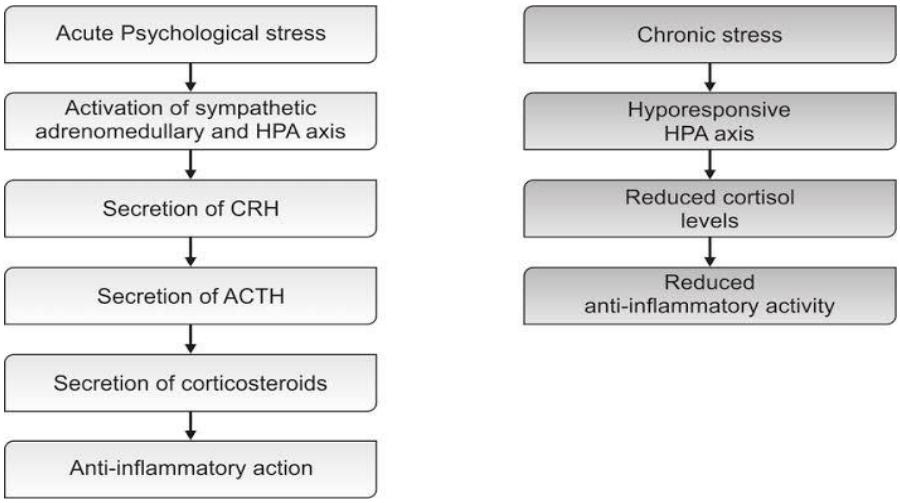
- Heart disease
- Diabetes
- Obesity
- Depression or anxiety
- Skin problems, such as acne or eczema
- Menstrual problems

On the off chance that you as of now have a medical issue, ongoing pressure can exacerbate it.

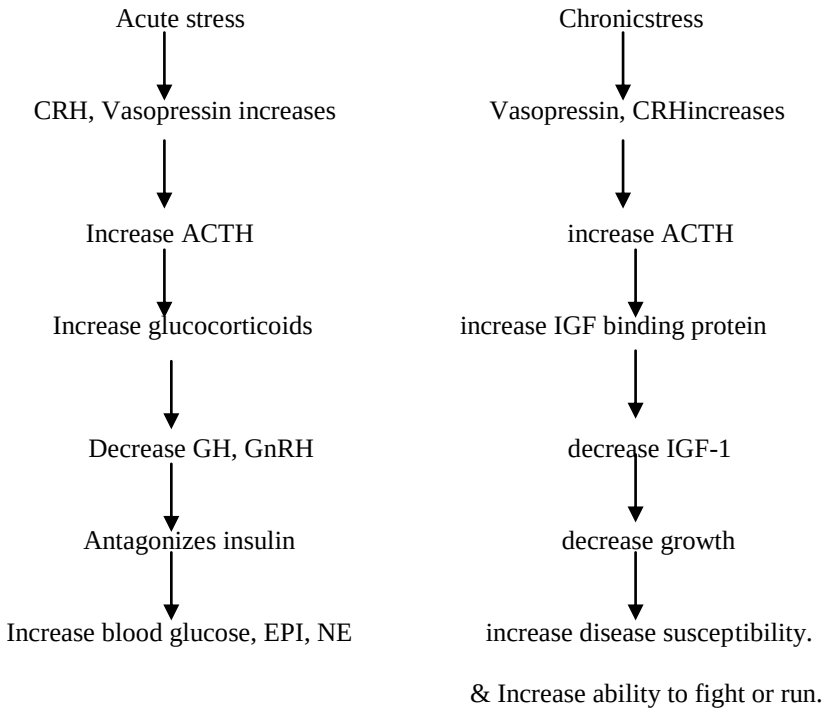
Signs of too much stress: [14]

- Diarrhea or constipation
- Forgetfulness
- Frequent aches and pains
- Headaches
- Lack of energy or focus
- Sexual problems
- Stiff jaw or neck
- Tiredness
- Trouble sleeping or sleeping too much
- Upset stomach
- Use of alcohol or drugs to relax
- Nausea
- Weight loss or gain

Mechanism of acute and chronic stress



Neuro endocrine regulation & difference between acute and chronic stress[15]



These figures show the difference between the 2 types of stress responses. This also shows the difference in the hormone secretions in response to 2 stressors. Acute stress shows an increase in vasopressin than CRH in the hypothalamus, where as chronic stressors shows an opposite effect. The resultant impact on development chemical and blood glucose levels empower the creature to react quickly to the intense stressors by expanding their capacity to run or flight. On the other hand, chronic stress has long term effects such as reduced growth and increased susceptibility to diseases.

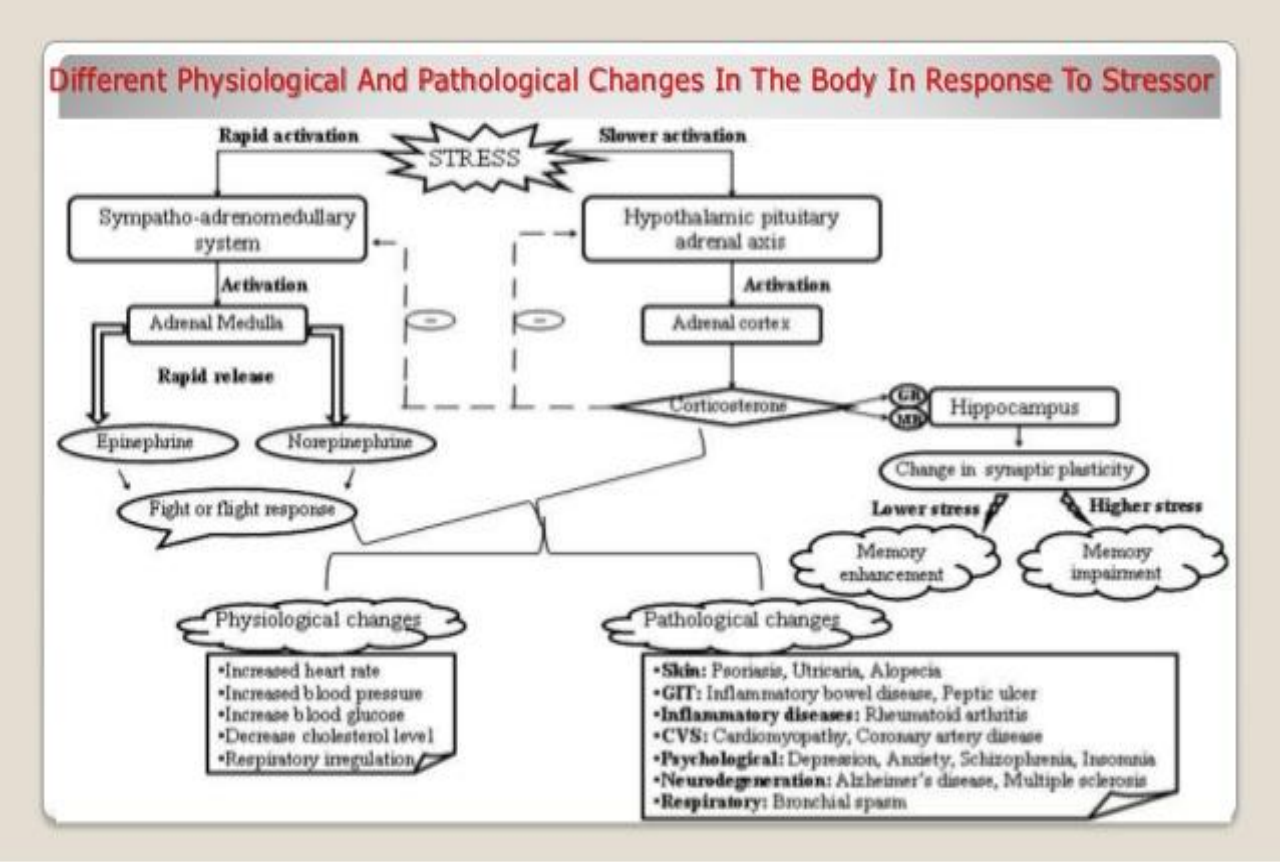


Fig.2: physiological and pathological changes in the body.

- Rapid activation of fight or flight response due to rapid release of epinephrine and nor epinephrine leads to pathological and physiological changes in our body.
- Slower activation of hypothalamic pituitary adrenal axis leads to activation of adrenal cortex and corticosterone which causes the change in synaptic plasticity which shows enhancement and impairment of memory.
- Physiological changes may be increased heart rate, increased blood pressure, increased glucose levels in the blood, and decreased cholesterol levels and also respiratory irregulation.
- Pathological changes may be psoriasis, alopecia, utricaria, inflammatory bowel disease, peptic ulcer, coronary artery disease, depression, anxiety, and bronchial spasm.

Animal models used for screening anti-stress

Forced swim test (FST)[16]

- It is the tendency of the living being to escape a noxious condition.
- If the animal is not able to escape the stressful stimuli or it feels threatened, the animal will show the stress response.
- This principle is used for developing forced swimming model for inducing stress in laboratory animals.

Procedure:

Animals-Adult albino rats (200-250g) of either sex

The animals are divided into 5 groups of 6 rats in each group

- Group 1-received saline served as vehicle control
- Group 2-received saline and stress,served as stress control
- Group 3-received standard drug, diazepam (2mg/kg i.p) and stress, served as positive control.
- Group 4-treated with test-1 compound and stress
- Group 5-treated with test-2 compound and stress

Treatment is given to rats, once daily for a period of 7 days.

↓

On the 8th day the rats are subjected to swimming stress by keeping them in tank of dimensions (37 X 37 X 30 cm), filled with water to the height of 25cm.

↓

The end point is taken when the animal started drowning and the mean Swimming time for each group is calculated.

↓

After induction of stress,blood is collected,serum is separated and biochemicalparameterslikeserum,glucose,triglycerides, cholesterol,BUN(Blood, Urea, and Nitrogen),cortisol and blood cell count are estimated.

Tail suspension test (TST) [17]

The animals were suspended independently toward the finish of the tail by utilizing miniature pore sticky tape of (around 1 cm) with the head 50cm from the base in a suspension box 40mins post restriction stress technique.

↓

Rats were suspended for an aggregate of 6 min. During the last 4 min time span test, term of inaction was recorded.

↓

Rats are viewed as stationary just when they are hanged latently and made totally still.

↓

Anti-stress lessens the idleness of rodents in this test.

Anoxia stress resilience test [18]

Animals are set in an airtight vessel of 1L limit

↓

After treatment with the medication, place the creatures into the vessel on seventh, fourteenth, 21st, day (i.e.) toward the finish of first, second and third week separately.

↓

Introduce the pressure to the creatures in the vessel

↓

Then the animals show the main spasms.

↓

Immediately, eliminate the creatures from the vessel and goes through revive (if needed).delay in expulsion of creatures might prompt demise. Record the time term of section of creature into the vessel and presence of the first spasm is called as-Anoxia resilience time.

Open field test (OFT)[19]

Measurement of exploratory locomotor action in 5minutes trial happens in an open field of (45 X 45cm) by an Accuscan contraption.

↓

Total distance, immobilitytime, time spent in the middle and inactivity until the middle region was entered for the first time were recorded consequently by infrared locators, and the information were moved to an associated pc.

Learned vulnerability test [20]

On the twelfth day of experimentation, rodents were exposed to foot shock in a two compartment bouncing box which is having a break entryway to the abutting un-zapped compartment shut.

↓

The practice proceeded for 1hour.

↓

On day 14,48h later, the rodents were exposed to evasion preparing, utilizing a similar contraption however keeping get away from course to the un-zapped camper open.

↓

During this aversion preparing the rodents were set in the electric chamber and permitted to adapt for 5 min prior to being exposed to 30 evasion trails, with a between preliminary timespan seconds.

↓

During the first 3 seconds of the preliminary, a bell improvement conveyed through a network floor for the following 3 seconds.

↓

The aversion reaction was described by getaway to the abutting safe chamber during adapted improvement.

↓

Failure to circumvent during unconditioned improvement inside 15 seconds was surveyed as departure disappointment which is utilized to show the downturn or stress.

Gastric ulceration test

Creation of gastro duodenal ulcerations gives off an impression of being inescapable outcomes of stress, the force of infection relying on the term of pressure circumstance and seems to include pressure initiated autonomic and neuroendocrine framework actuation.

Procedure:

- Adult male wistar rodents weighing 180-220g are utilized. They are housed in confines at a surrounding temperature. The creatures have new admittance to standard pellet chow and drinking water.

↓

- Drugs are directed orally for 21 days, control creatures get just vehicle in a similar volume utilized for drug organization.

↓

- On day 21, rodents are killed by execution, the stomachs are parted open along the more noteworthy curve and the no. of discrete ulcers are noted through amplifying glass.

↓

- The seriousness of ulcers is scored after histological affirmation as

0 – no ulcer
1 – changes restricted to shallow layers of mucosa with no blockage
2 – Half the mucosal thickness shows the necrotic change
3 - More than 66% of mucosal thickness shows necrotic changes
4 – Complete obliteration of mucosa with drain.
There after the pooled ulcer score is determined.

Results and observations

This studies indicates that the plant sessile joyweed (*Alternantherasessilis*) possess anti-stress property. It also exerts a positive influence on the endocrine, cardiopulmonary and CNS. Toxicity studies reveal that sessile joyweed as a safe compound.

CONCLUSION

Stress in general is the pressure experienced by any individual's in response to the life demands. stress the board includes controlling and diminishing the strain that happens in distressing circumstances by making enthusiastic and physical changes. stress the executives includes controlling and decreasing the pressure that happens in unpleasant circumstances by making passionate and actual changes.To overcome this problem various anti-stress agents are required. For this purpose variety of safe and effective but long term use of these agents leads to side effects. Many anti-stress agents that is - anti-anxiety drugs like benzodiazepines and buspirone, anti-depressantdrugs like duloxetine and fluoxetine and beta blockers like propranolol and atenolol are used.so these drugs are also not useful in all cases on stress because these produces the adverse effects like heartburns,kidney problems and there is also an increased risk of ulcers.Therefore, traditional plants have very important role in the discovery of new drugs which has very less adverse effects. These traditional plants play a crucial role in human life since from ancient times. So, to overcome this problem traditional plant like *Alternantherasessilis* is used in this study to as anti-stress agent as this plant contains reported anti-oxidant activity. The reactive free radicle produced in anti-oxidant study is proportional for generation of stress. So, on the basis of this reported evidence this study is concluded that *Alternantherasessilis* has anti-stress activity.

Future scope-

This study helps to reduce stress which was the major problem now a days to all the people. So, in the near future, an overview will be created from this effort, which will assist researchers in obtaining knowledge on the challenge.

ABBREVATIONS-

FST-Forced swim test
TST- Tail suspension test
OFT- Open field test
ROS-Reactive oxygen species
ACTH-Adreno corticotropic hormone

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CONFLICT OF INTEREST

Authors do not claim any conflict of interest.

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