screening of cns stimulant activity of ethanolic fruit extract of *piper longum* Linn in rats

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Aim: In this study, the ethanolic fruit extract of *Piper longum* Linn was tested using an actophotometer to see if it could stimulate the rats' central nervous system. A phytochemical analysis of the fruits and the extract and fractions of *Piper longum* revealed the presence of tannins, flavonoids, glycosides, phenolics, diterpenes, and triterpenes. Among these, "piperine" is the main component that stimulates the central nervous system.

Methodology: An ethanolic extract of the *piper longum* fruit was made through suxhelation and then put through phytochemical analysis. The 36 wistar rats, both sexes, were divided into six groups of six each. I, II, III, IV, V, and VI are the six groups. Vehicle treatment was given to GROUP-I (0.5% CMC sod). P.O., Group-II, received chlorpromazine (1 mg/kg). I.P. Group III received a dose of caffeine (30 mg/kg). P.O., GROUP-IV received treatment with EEPL (100 mg/kg). P.O., GROUP-V received treatment with EEPL (200 mg/kg). EEPL (400 mg/kg) was administered to P.O. and GROUP-VI. The groups III, IV, V, and VI received chlorpromazine

treatments an hour after the test medications were given. After 30 minutes, the locomoter activity was evaluated using an actophotometer, and the locomoter index was computed. The information is presented as mean SEM. The statistical analysis employed ANOVA and the Dunnett's post hock test.

Result: Actophotometer analysis was used to determine the plant extract's CNS stimulating effect. When compared to animals treated with chlorpromazine and animals treated with caffeine, the plant extract and caffeine-treated group of animals showed an increase in the count in the actophotometer, indicating the extract's CNS stimulant activity.

Conclusion: The ethanolic extract of *Piper longum* Linn possess significant CNS stimulant activity.

Keywords: *Piper longum* Linn, Chlorpromazine, Caffiene, sod. Carboxy methyl cellulose.

INTRODUCTION

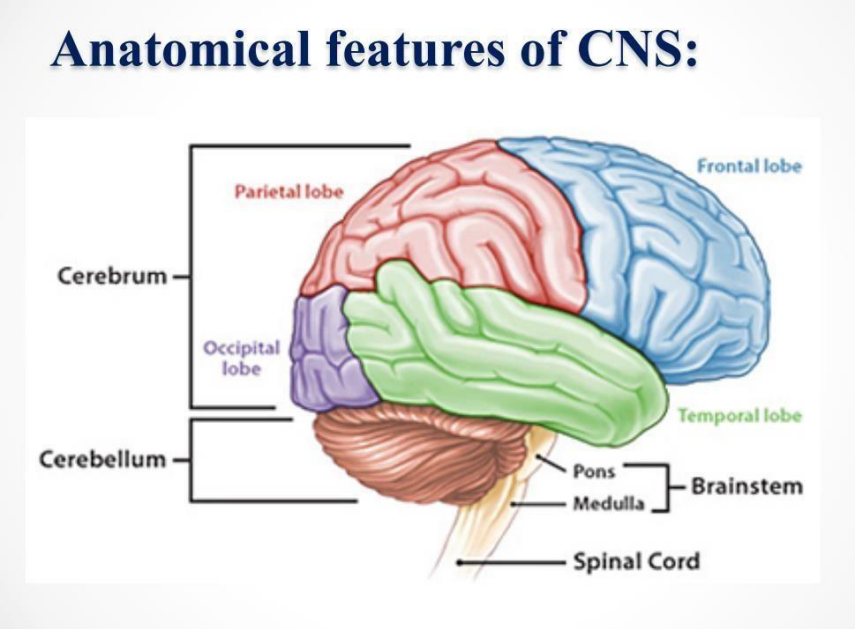

Fig: 1 Anatomical features of Brain

Anatomical features of CNS:

Cerebellum +pons ——equilibrium and coordination of movement.

Medulla oblongata ————contains the vital center, e.g., respiratory and cardio vascular centers.

Spinal cord ——responsible for all reflexes.

CNS stimulants:

They are substances that heighten sensory and motor actions in the muscles:

Their effects range from the development of convulsions (as with strychnine) to an increase in alertness and

wakefulness (like with coffee), and can occasionally result in overdose deaths.

MECHANISM OF ACTION:

Caffeine boosts the activity of adenyl cyclase and the production of cAMP via inhibiting phosphodiesterase and antagonistic adenosine A1 receptors.As voltage-gated calcium channels are open, calcium can enter while potassium channels are closed. More neurotransmitters are released by facilitating cell depolarization.

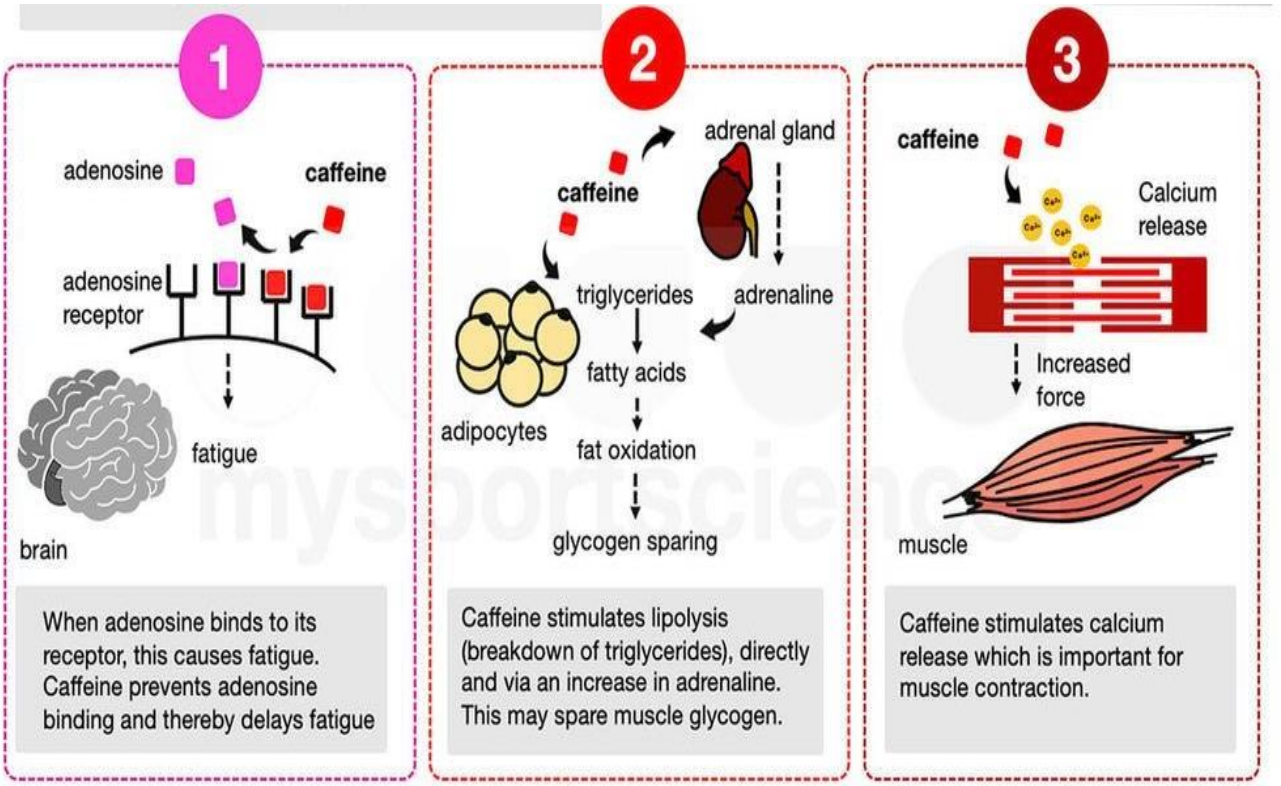

Fig: 2 Mechanism of action of caffeine

Depression, a type of chronic mental illness, affects a person's feelings, thoughts, behaviour, and physical health. It is a typical yet serious condition that can make it hard for a person to enjoy life and limit their capacity to carry out even the most fundamental daily tasks (Fekadu et al., 2017). Therefore, CNS stimulants are vital medications whose main effects are to increase specific physical and mental brain functions or to promote CNS activity (Sonpetkaretal., 2012; Tripathi, 2013). According to Saha and Banerjee (2013), CNS stimulants are helpful for lowering weariness and sleepiness and raising mental alertness. Herbal remedies have been utilised for several decades to treat and even cure diseases and their disorders (Bishwo et al., 2016). Herbs are utilised ethnopharmacologically for the treatment of pain alleviation, wound healing, and eradicating ever that provide helpful information to identify a wide range of substances to develop new treatments for cancer, hypertension, diabetes, and antiinfective drugs (Zamanetal., 2015).

PLANT PROFILE:

Fig: 3 *Piper longum* Linn plant

Fig: 4 *Piper longum* Linn fruit

Piper longum Linn is a little shrub with multiple creeping, jointed branches that are thickened at the nodes, a huge woody root, and many leaves. With varying-sized blades, the leaves are alternating and lack stipules. The flowers are grown in solitary spikes, with the lowest leaves about 5-7 cm long and the lower ones measuring 2-3 cm. Oblong, blunt, and dark green in colour, the fruits are spiked with flesh that is 2.5–3.5 cm long and 5 mm thick. A commercially valuable type of *Piper longum* is gathered when the spikes are ripe.[1]

The plant is cultivated across India, including in the evergreen forests of Assam, Maharashtra, Madhya Pradesh, Tamil Nadu, and Andhra Pradesh. Long pepper is a plant that is extensively cultivated in areas with strong rainfall, limestone soil, and high relative humidity.[3]

Scientific classification:[3]

Kingdom: *Plantae*
Division: *Magnoliophyta*
Class: *Magnoliopsida*
Order: *Piperales*
Family: *Piperaceae*
Genus: *Piper*
Species: *Piper longum*

Piper longum are used as an antidote for snake bites as well as to treat fever, asthma, haemorrhoids, bronchial stress, stomachaic, liver diseases abdominal pain, inflammation, and jaundice. The primary active ingredient in the *Piper longum* plant is piperine, which has been linked to hepatoprotective, analgesic, antidiabetic, antiviral, antipyretic, antioxidant, and anti-inflammatory effects. It is classified as panchakola, Shudhashana in Ayurveda and is regarded as a fantastic treatment for dipaniya (stomachic) and pachaniya (digestive). According to numerous clinical research, pippali significantly reduces the symptoms of childhood bronchial asthma.[2]

Phytochemical constituents:

Numerous bioactive substances, such as alkaloids, carbohydrates tannis, saponins, amides, lignans, esters, and volatile oils, have been identified and the topic of in-depth research on the phytochemistry of plant parts like *Piper longum* roots and fruit. *Piper longum* fruits contain a variety of alkaloids, such as Piperine and its methyl variants, asarinine, pellitorine, piperlongumine and piperlonguminine, Brachystamide-A, pipercide, and piperidine. *Piper longum* contains the lignans sesamin and fergesin.[4]

Materials and methodology:

The tool was put together. A 450ml round-bottom flask was used, and ethanol was used as the solvent.The thimble was filled with 30g of fruit powder, and it was then put into the extraction tube. The extraction tube was then connected to the flask holding the solvent after the thimble was put in place. The extraction tube was connected to the condenser, which then started the water running. The Soxhlet apparatus was then put on the heating plate with the temperature maintained at 70 degrees Celsius. After condensing, the solvent begins to evaporate and drips into the extraction tube. The procedure was carried out repeatedly until all of the medication was removed from the sample of fruit power. The extraction process was stopped once all of the medication had been extracted, and the thimble was removed.

The solvent was then recovered by heating the extraction tube, which was connected to the flask containing the solvent. The equipment was cleaned when the process was stopped.

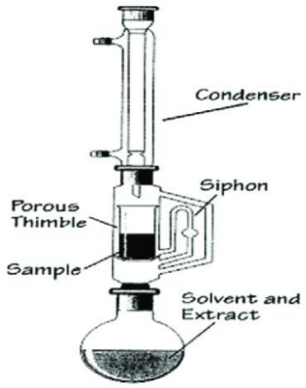

Fig: 5 Soxhlet apparatus

Actophotometer:

Actophotometer test: Dews P.B. (1953) first described the Actophotometer, which was used to track animal locomotor behaviour. An actophotometer (made by Dolphin) with a digital counter, photocell, and light source was used to measure the locomotory activity of the animals. The basal activity score for each animal was recorded after it was placed in the Actophotometer for five minutes. The proper medication was given to each animal, and after 30 and a half hours, the activity score was recorded. The rise in score served as an indicator for the stimulant's effect on the CNS.[5]

Results:

It was discovered that 10% of the dry powder's ethanolic extract of Piper longum Linn was yielded. Alkaloids, saponins, tannins, carbohydrates, fixed oils, and lipids were found in the Piper longum Linn fruit extract after preliminary phytochemical analysis.

Table:1 PRELIMINARY PHYTOCHEMICAL SCREENING OF *PIPER LONGUM LINN* FRUIT POWDER EXTRACT:

SL.NO	PHYTOCONSTITUENTS	OBSERVSTION
1	ALKALOIDS	+
2	SAPONINS	+
3	CARBOHYDRATES	+
4	TANNINS AND PHENOLS	+
5	FLAVONOIDS	-
6	FIXED OILS AND FATS	+
7	LIGNIN	+

Note '+' shows the presence of phytochemical '-'shows the absence of phytochemical.

Table:2 Evaluation of locomotor index using Actophotometer

SL. NO		**LOCOMOTOR INDEX**		
	TREATMENT	**BEFORE TREATMENT**	**AFTER 30 MIN**	**AFTER 60 MIN**
1.	Vehicle	232±0.58$^{\#}$	237±0.79$^{\#}$	245±1.03$^{\#}$
2.	Chlorpromazine (1mg/kg)	167± 0.58	92±0.58	56±0.58
3.	Caffeine (30mg/kg)	211± 1.07	227± 0.82***	241±0.73***
4.	EEPL (100mg/kg)	168±0.89	189±0.93*	195±0.55**
5.	EEPL (200mg/kg)	183±0.86	194±0.93***	206±0.78***
6.	EEPL (400mg/kg)	197±0.97	209±0.86 ***	218±0.80***

n=6, values are mean ± S.E.M, one way ANOVA followed by Dunnett's post hock test. Significant at, #P<0.05 v/s control, P<0.05,*P<0.01,***P<0.001 v/s Chlorpromazine. EEPL-Ethanolic fruit extract of *Piper longum* Linn.

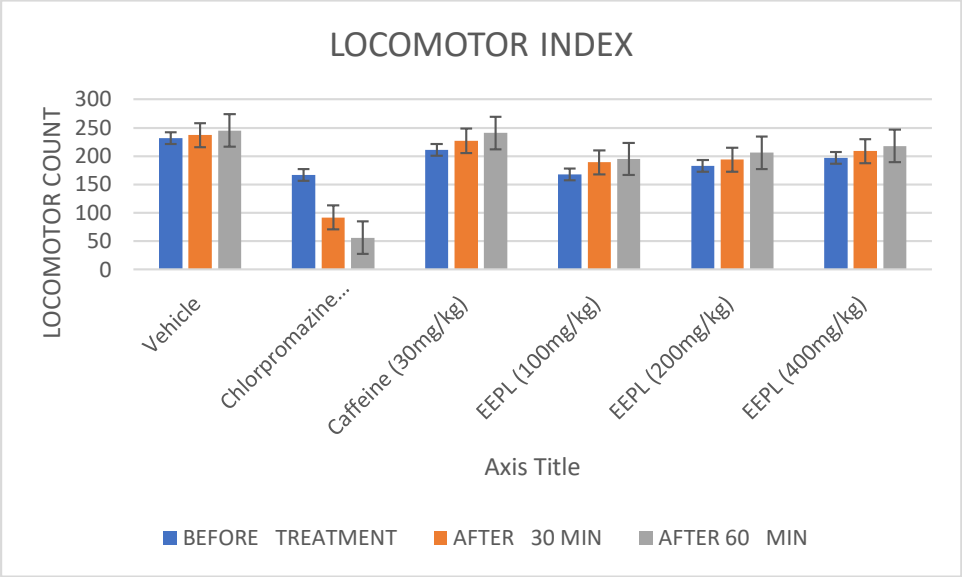

Fig: 6 Evaluation of locomotor index using Actophotometer

n=6, values are mean ± S.E.M, one way ANOVA followed by Dunnett's post hock test. Significant at, #P<0.05 v/s control, P<0.05,*P<0.01,***P<0.001 v/s Chlorpromazine. EEPL-Ethanolic fruit extract of *Piper longum* Linn.

Discussion:

The goal of the current study was to evaluate the ethanolic fruit extract of *Piper longum* Linn's potential CNS stimulating properties. The evaluation of CNS stimulant activity was done by evaluating % locomotor activity by actophotometer. The % yield of the fruit extract was found to be 10%. The fruit extract of *Piper longum* Linn, when subjected to phytochemical analysis, included a number of phytoactive substances, including alkaloids, saponins, polysaccharides, tannins, phenols, and fixed oils. It is clear from the results that the animals given caffeine have a higher locomotor count than the ones given chlorpromazine. Animals treated with the extract showed increased count compared with the animals treated with caffeine. The low, moderate and high doses treated group of animals have showed the increased locomotor count dose dependently. The animals treated with higher dose of ethanolic fruit extract showed the significant increase in the loco-motor count when compared to the low and moderate doses. Previous literature search and prior studies indicated the presence of alkaloids, saponin, carbohydrates, tannins, phenols, and fixed oils in the ethanolic fruit extract of *Piper longum* linn. Hence these phytochemical constituents may be responsible for the CNS stimulant activity of fruit extract of *Piper longum* linn.

Conclusion:

Significant CNS stimulant action is seen in *Piper longum* Linn's ethanolic fruit extract.

Alkaloids, saponins, polysaccharides, and tannins were shown to be responsible for the plant extract's CNS stimulant effect, according to the current study. Chlorpromazine (1 mg/kg) significantly depressed the central nervous system. It was discovered that EEPL provided defence against depression caused by chlorpromazine. As a CNS stimulant medication that treats depression, EEPL has thus been identified in the current investigation. This study showed that EEPL had a dose-dependent effect on depression caused by chlorpromazine, with 400mg/kg of EEPL being more efficacious than 200mg/kg and 100mg/kg p.o.

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