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Evaluation of anxiolytic, muscle relaxant & locomotor activity of cuminum cyminum

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Abstract
C*uminum cyminum* is a small annual herbaceous plant that is a member of the aromatic plant family (Umbelliferae). In the last few decades cumin has proved its use in treatment of various medical disorders like inflammation, increase urination, prevent gas and supress muscle spasms. Essential oils from the C*uminum cyminum* were extracted from the seeds of cumin by using ethanol. They have also been reported from several New Kingdom levels of ancient Egyptian archaeological sites. The main components of cumin were p-menthol, cuminaldehyde, y-terpinene and beta-pinene. The oil, which is derived by steam distillation, is used to flavour alcoholic beverages, desserts and condiments. It is also used as a fragrant component of creams, lotions, and perfumes. The seeds are also rich source of many flavonoid phenolic anti-oxidant vitamins like vitamin E, vitamin B-6, niacin, riboflavin and other vital anti-oxidants. The seeds are also rich source of many flavonoid phenolic anti-oxidant, the study has proved that cumin seeds possess anxiolytic, muscle relaxant and depressant of locomotor activity. This is because the seeds of *Cuminum cyminum* contain the chemical constituents which have their effect on the anxiety, muscle relaxation and locomotion. In addition to nutrients such as amino acids, minerals and vitamins, dietary supplementation with herbs and plant products have also been shown to be effective in treating anxiety.

Keywords: C*uminum cyminum,* Umbelliferae, anxiety, muscle relaxation, locomotion

Introduction
Cumin is the dried seed of the herb *Cuminum cyminum*, a member of the parsley family. The cumin plant grows to 30–50 cm (12–20 in) tall and is harvested by hand. It is an annual herbaceous plant, with a slender, glabrous, branched stem that is 20–30 cm (8–12 in) tall and has a diameter of 3–5 cm (1 ¼–2 in) [1, 6]. Cumin seed is used as a spice for its distinctive flavour and aroma. It is commonly used in traditional Brazilian cuisine. Cumin can be an ingredient in chili powder (often Tex-Mex or Mexican-style), and is found in *achiote* blends, *adobos*, *sofrito*, *garam masala*, curry powder, and *bahaart* In Myanmar, and used as a spice [2, 3]. The strong aromatic smell and warm, bitter taste of Cumin fruits are due to the presence of a volatile oil, cumin aldehyde, which exists in the proportion 2.5 to 4%. It is separated by distillation of the fruit with water. It is limpid and pale yellow in colour, and is mainly a mixture of cymol or cymene and cuminic aldehyde, or cyminol, which is its chief constituent. Traditional uses of cumin include to reduce inflammation, increase urination, prevent gas, and suppress muscle spasms. It has also been used as an aid for indigestion, jaundice, diarrhea, and flatulence [4, 5]. Cumin powder has been used as a poultice and suppository, and has been smoked in a pipe and taken orally. Cumin is a major component of curry and chili powders and has been used to flavor a variety of commercial food products. The oil, which is derived by steam distillation, is used to flavour alcoholic beverages, desserts and condiments. It is also used as a fragrant component of creams, lotions, and perfumes [7]. Her the standard drug used is Diazepam, first marketed as Valium, is a medication of the benzodiazepine family that typically produces a calming effect. It is commonly used to treat a range of conditions including anxiety, alcohol withdrawal syndrome, benzodiazepine withdrawal syndrome, muscle spasms, seizures, trouble sleeping and restless legs syndrome [3]. It may also be used to cause memory loss during certain medical procedures [8, 9]. It can be taken by mouth, inserted into the rectum, injected into muscle, or injected into a vein [10]. When given into a vein, effects begin in one to five minutes and last up to an hour [11]. By mouth, effects may take 40 minutes to begin. Anxiolytic: Extreme worry or fear that lasts more than six months. Anxiolytics are a type of prescription medication used to treat symptoms of acute

anxiety. These medications tend to work rather quickly. However, they can be habit-forming and are usually prescribed for short-term use. Anxiolytics are not recommended for people with a history of substance abuse. Side effects from anxiolytic medication may include drowsiness and dizziness. Be sure to follow dosage and usage instructions carefully. A muscle relaxant is a drug which affects skeletal muscle function and decreases the muscle tone. It may be used to alleviate symptoms such as muscle spasms pain and hyperreflexia. The term "muscle relaxant" is used to refer to two major therapeutic groups: neuromuscular blockers and spasmolytics. Neuromuscular blockers act by interfering with transmission at the neuromuscular end plate and have no central nervous system (CNS) activity. They are often used during surgical procedures and in intensive care and emergency medicine to cause temporary paralysis. Locomotor activity refers to the movement from one location to another. In rodents, one of the most important components of exploration, a prominent activity of the animal's repertoire of spontaneous activity, is locomotion. Moreover, locomotor activity and exploration are involved in many behavioral and physiological functions and are influenced by many external factors, such as environmental conditions (light, temperature, noise) and novelty, and internal factors, such as circadian rhythm, food- or drink-deprivation, prior handling by the researcher, age, gender, strain, and many other factors. Development of behavioral measurements of locomotor activity and exploration was in part relevant in various rodent models as an initial screen for pharmacological effects predictive of therapeutic drug efficacy in humans. Spasmolytics, also known as "centrally acting" muscle relaxants, are used to alleviate musculoskeletal pain and spasms and to reduce spasticity in a variety of neurological conditions. While both neuromuscular blockers and spasmolytics are often grouped together as muscle relaxants [12, 13]. The term is commonly used to refer to spasmolytics only [14, 16].

Materials and Methods

The designing of methodology involves a series of steps taken in a systematic way in order to achieve the set goal under the prescribed guidelines and recommendations. It includes in it all the steps from field trip to the observation including selection and collection of the medicinal plant, selection of dose value, standardization protocol, usage of instruments, preparation of reagents, selection of specific solvents for extraction, formation of protocols and final execution of standardized protocol. All these requires good build of mind and soft technical and to handle the materials and procedures in a true scientific manner. This Study was approved by Institutional Ethical Committee of Geethanjali College of Pharmacy, Hyderabad, India. Healthy adult albino wistar rats weighing 30-40 grams of either sex were selected for the study. Animals were housed in appropriate cages in uniform hygienic conditions and fed with standard pellet diet (Amrul Laboratory animal diet) and water ad libitum. Animals were housed within the departmental animal house and the room temperature was maintained at 27ºC. The seeds of *Cuminum cyminum* were collected & air dried under shade at room temperature and finely powdered in a mixer-grinder. 82 gm of cumin powder was utilized for extraction with ethanol by using Soxhlet apparatus for 72 hours. The solvent was removed by evaporating it on the water bath. The dried extract was stored in refrigerator until further studies. The anxiolytic activity was determined using Elevated plus maze apparatus. 24 albino mice (20-40 g) of either sex, were randomly divided into 4 groups, each group containing 6 mice. Animals were placed in the plus maze apparatus head facing towards the closed arm and the time spent by the each animal in the open arm was noted using stop watch. The basal and the after drug response was noted. The muscle relaxant property was studied by using rota rod apparatus. The animals were divided into 4 groups and control, standard, test-1, and test-2. Animals are placed one by one on the rota rod apparatus and the fall of time of the each animal was noted down when the animal falls down from the rotating rod.

Locomotor activity was determined by using digital actophotometer where continuous beam of light falls on photo electric cell. Continuous beam of light falls on photoelectric cell when the reading is considered as zero. Any cut off in the continuity of light by animal-movement is recorded on a digital counter in the form of counts. Depending on CNS depressant action of the drug the animal show reduced locomotor activity. [17]

Result and Discussion

Administration of cumin oil suppressed the development and expression of morphine tolerance (as measured by tail-flick method). The morphine dependence was also reversed in a dose-dependent manner as evaluated by decreased conditioning scores (the acquisition and expression of morphine-induced conditioned place preference) in mice [18, 19]. Earlier study also suggests that some components of the *Cuminum cyminum* seed attenuate the excessive effect of L-arginine on morphine-induced CPP through the NOS inhibitory mechanism. It seems that cumin FEO possibly acts as a NOS inhibitor [20]. It has been shown that KCl affects calcium channels and calcium channel blockers have bronchodilatory effect [21].

Anxiolytic activity of *Cuminum cyminum*

Percentage increase of the time in the open arm and the control, standard, and the test compound where shown in the table: 1. Here the test compound is ethanolic extract of *Cuminum cyminum*, Diazepam is the standard drug.

Table 1: Effects of extracts of *Cuminum cyminum* on anxiolytic activity:

Groups	Dose	Before Drug Response	After Drug Response	% Increase Of Time In Open Arm
Control	---------	78.5 ± 10.84	70.75 ± 11.29	9.87
Standard	5mg/Kg B.W	83.5 ± 4.61	55.1 ± 9.76	34.01
Test 1 A	200mg/Kg B.W	89.6 ± 11.84	69.3 ± 13.36	24.31
Test 2 A	400mg/Kg B.W	79.5 ± 5.32	53.16 ± 10.2	33.13

- ✓ Here all the values are expressed as mean ± SD values.
- ✓ Probability of significance (P) < 0.01.
- ✓ Statistical methods used for calculations is one way ANOVA

Muscle relaxant activity of *Cuminum cyminum*

Percentage decrease of the falling time from the rod, the control, standard, and the test compounds where shown in the table: 2 the test compound is ethanolic extract of *cuminum cyminum*, Diazepam is the standard drug.

Table 2: Effects of extracts of *cuminum cyminum* on muscle relaxant activity

Groups	Dose	Falling Time (before drug response) Sec	Falling Time (after drug response) Sec	% Decrease In Falling Time
Control	---------	73.6± 7.31	69.6 ± 9.43	5.43
Standard	5mg/Kg B.W	77.8 ± 2.78	35.3 ± 7.73	54.62
Test 1 A	200mg/Kg B.W	81.5 ± 3.08	67.8 ± 5.23	16.80
Test 2 A	400mg/Kg B.W	73.1 ± 8.06	50.3 ± 7.53	31.190

- ✓ Here all the values are expressed as mean ± SD values.
- ✓ Probability of significance (P) < 0.01.
- ✓ Statistical methods used for calculations is one way ANOVA

Locomotor activity of *Cuminum cyminum*

Percentage decrease in locomotor activity, the control, standard, and the test compounds where shown in the table: 2 the test compound is ethanolic extract of *Cuminum cyminum*, Diazepam is the standard drug.

Table 3: Effects of extracts of *Cuminum cyminum* on locomotor activity

GROUPS	DOSE	Locomotor activity (Before Drug Response) no	Locomotor activity (After Drug Response) no	% Decrease In Locomotor Activity
Control	---------	118.3± 6.50	116.8 ± 6.61	19.56
Standard	5mg/Kg B.W	124.8± 6.30	60.8 ± 3.25	51.28
Test 1 A	200mg/Kg B.W	112.5 ± 3.20	81.6 ± 4.13	27.02
Test 2 A	400mg/Kg B.W	112.8 ± 2.31	54.5 ± 5.39	51.68

- ✓ Here all the values are expressed as mean ± SD values.
- ✓ Probability of significance (P) < 0.01.
- ✓ Statistical methods used for calculations is one way ANOVA

Here the result (Table: 1) suggests that with increase in dose of *Cuminum cyminum* ethanolic extract muscle relaxant activity is also increasing proportionately. The higher dose (400mg/ Kg b.w) having comparable muscle relaxant activity with that of the standard drug (Diazepam). The fall of time of the mice were found to be increased after the injection of the test drug of higher dose. It means that the test drug contain the constituents which produced the muscle relaxant activity. Here the findings (Table: 2) suggest that with increase in dose of *Cuminum cyminum* ethanolic extract locomotor activity is also decreasing in proportion. Here the higher dose (400mg/ Kg b.w) is producing comparable decrease in locomotor activity with that of the standard drug (Diazepam) than the lower dose (200mg/Kg B.W) of the test drug *(Cuminum cyminum).* The before drug response was recorded to be more when compared to the after drug response. Due to the presence of the muscle relaxant activity of the test drug (i.e.*: Cuminum cyminum)* the locomotor activity was found to be decreased. Here the findings (Table: 3) suggest that with increase in dose of *Cuminum cyminum* ethanolic extract anxiolytic activity is also increasing in proportion. Here the higher dose (400mg/ Kg b.w) producing comparable anxiolytic activity with that of the standard drug (Diazepam) than that of the lower dose (200mg/K g b.w). Because of the anxiolytic activity caused by the C*uminum cyminum* the mice preferred to stay in the open arm for the longer duration of time when compared to the control group animals.

Fig 2: Actophotometer showing locomotor activity

Fig 2.1: Injecting ethanolic extract to the mice

Fig 1: Mice preferring the open arm after injecting ethanolic extract

Fig 2.2: Depiction of the muscle relaxant activity

Conclusion

Through such findings we can conclude that *Cuminum cyminum* posses the anxiolytic activity, and muscle relaxant activity. The ethanolic extract of the *Cuminum cyminum* has shown anxiolytic, muscle relaxant activity and also decrease in the locomotor activity when compared with the control and the standard drugs. Therefore the effects observed in the study may be due to the activity of one or more combination of some of the identified constituents. Nonetheless, the pharmacological activities found in *Cuminum cyminum* overwhelmingly substantiate their preferred use in traditional medicaments.

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