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Phytochemical investigation and sweating inhibitory effect of *Clitoria ternatea* leaves

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ABSTRACT: Background: *Clitoria ternatea* L. (*Fabaceae*) commonly known as Butterfly pea, a standard Ayurvedic medicine, has been extensively used as a memory enhancer, nootropic, antistress, anxiolytic, antidepressant, anticonvulsant, tranquilizing and sedative agent. A wide range of secondary metabolites including Triterpenoids, FlavonolS, Glycosides, Alkaloids, Anthocyanins and Steroids has been isolated from *C. ternatea* Linn. **Aim:** The present study was aimed to evaluate the control of hyperhidrosis activity of *C. ternatea*. **Methods:** The leaves of *C. ternatea* were extracted by Soxhlation by using the ethanol as solvent. The ethanol extract was screened for the detection of phytochemicals. The mouse foot screen model was used for evaluation of sweat inhibition effect of extract by using Albino mice as the animal model. The 0.9 % w/v was used as normal control. The glycopyrrolate and Scopolamine at a concentration of 0.9 % was used as a standard control. **Results:** The ethanolic IC_{50} values and their 95% confidence limits for the quality extract solution of *C. ternatea* and for duplicate trails with four compounds are compared in sweat inhibitor. The mouse foot screen for sweat inhibition by anticholinergic drugs permits the comparison of the activity of the inhibitors directly upon the sweat glands bypassing cutaneous barriers. The *C. ternatea* was found to be equipotent or better activity comparing with the standard for sweat inhibition as they allow determining the potency ratio with reference to the test sample. **Conclusion:** The ethanol leave extract of *C. ternatea* exhibited significant potency in inhibiting sweating.

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INTRODUCTION:

Clitoria ternatea is believed a very bioactive plant and used in various diseases as folklore medicine. The roots are being used as diuretic and seeds as Cathartic in the traditional system of medicine particularly in Ayurveda. The roots, seeds and leaves of *C. ternatea* have long been Kancheepuram district of Tamilnadu. *C. ternatea* is locally known as Sangu widely used as a brain tonic and is believed to promote memory and intelligence [1,2]. According to Pushpam, root powder is mixed with water and taken

orally to treat indigestion, eye diseases and headache. According to Chhattisgarh state, it is used as a diuretic, the crushed fresh root bark is taken with a cup of warm milk 20 days for 2 weeks. It is used as a purgative, 50 g crushed seeds is taken with a cup of water once a day for 3 days. According to Rajshahi district in Bangladesh, *C. ternatea* is boiled in water and the water strained through a cloth. About 1/32 kg of the strained water is to be taken for 7 days in urinary problems [3,4]. In Tamilnadu, the potential of extract exhibited most potent activity and this provides more support for the concept of scientific validation of traditional plant medicines in the fight against infectious diseases. Root juice applied to the nose for migraine [5,6].

It has been calculated that about 1% of the human body weight needs to be evaporated as sweat to prevent a 108 °C rise in temperature. Unfortunately, in some cases, people's ability to sweat in response to heat or exercise is often compromised, therein some may overproduce sweat or while others lack the power to sweat, which can cause health and psycho-social problems [7,8]. Heat is primarily lost from the body by the heat of transformation of evaporation of the sweat fluid from the skin surface; however the efficiency of evaporative heat loss is affected by the warmth and humidity of the prevailing atmosphere [9,10]. Most mammals have sweat glands; it's only higher primates, horses and a few breeds of cattle that use sweating for thermoregulation in response to heat or exercise. It is generally thought that other mammals use secretions from sweat glands, in conjunction with other skin glands, for defense and conditioning of the skin, as well as lubricating contact surfaces, such as the palms and eyelids [11,12].

The objective of this study to evaluate the *C. ternatea* leaves ethanol extract for inhibition of sweating.

Fig 1. The flowering plant of *C. ternatea.*

The objective of this study to evaluate the *C. ternatea* leaves ethanol extract for inhibition of sweating.

MATERIALS AND METHODS:

The ethanol of the analytical grade was purchased from HiMedia Laboratory, Mumbai. , Mumbai. The standard drugs glycopyrrolate and Scopolamine was purchased from Merck, India.

Preparation of plant extracts:

The leave of *C. ternatea* after the collection was stored in a cool and dark place. The leave sample was shade air-dried for 2 to 4 weeks. The dried leave was made coarse (100 g) powder by using mortar and pestle. The leaves were extracted by a hot continuous Soxhlator extractor (Borosil, India) by using ethanol as solvent. After the effective extraction, the solvent was distilled off. The extract was then concentrated on a water bath. The crude extract was kept in airtight container and kept for further study [13,14].

Phytochemical Screening:

The extract was evaluated for the presence of phytochemicals that are Alkaloids, Flavonoids, Glycosides, Phenols, Saponins, Tannins and Resins, as per the standard procedure as specified in Literature [15-18].

Evaluation of sweating Inhibitory activity of *C. ternatea*:

In this study, the albino mice of the approximate weight of 25 to 30 g were used as animal models. The mice were anesthetized intraperitoneally. Both feet and hind were painted with a 2 % solution of iodine ethanol which was permitted to dry. The animals have divided 4 groups of 3 animals in each group. Animals were administered 0.9 % NaCl solution overnight before the experiment. The first group of mice was administrated with 0.9 % of NaCl intravenously. The second group of mice was administered with 0.9 % of NaCl plus 0.1 % of glycopyrrolate subcutaneously. The group three mice were administered with 0.9 % of NaCl plus 0.1 % of scopolamine subcutaneously. The group four mice were administered with leaves ethanol crude extract of *C. ternatea* at a dose of 0.1 % subcutaneously. After 5 min, test solution injection sweating was stimulated by injecting each animal intraperitoneally with 0.2 ml of 1 mg/ml extract drug solution in 0.9 % of NaCl. The looks of blue-black spots within 5 min after stimulating by the Glycolpyrrolate, scopolamine and *C. ternatea* leave was the criterion for sweating 2 mice per

concentration were injected within the right foot with 0.9 % NaCl to be used non inhibited control the median inhibitory concentration for sweat inhibition with its 95 % confidence limits. The given *C. ternatea* extract also affected the surplus sweat formation. Test for parallelism of slope between test compounds and therefore the standard was applied and potency ratios relative to the quality with their confidence limits were also determined the compounds screened include scopolamine [19-23].

RESULTS AND DISCUSSION:

The Soxhlation method was found to be efficient for the effective extraction of leaves of *C. ternatea* leaves. The phytochemical study revealed that the leaves ethanol extract of *C. ternatea* possess phytochemicals that are Tannins, Resins, Saponins, Flavonoids, Phenols, Glycosides, Alkaloids and Steroids (Table 1).

Table 1. Phytochemical screening data of *C. ternatea* ethanol extract.

Sl. No.	Phytochemicals	*C. ternatea* ethanol extract
1	Alkaloids	Present
2	Flavonoids	Present
3	Glycoside	Present
4	Phenols	Present
5	Saponins	Present
6	Resins	Present

Upon injection with *C. ternatea* leave extract solution the mice began to salivate profusely also as sweat uniformly on the footpads both hind feet in saline-injected control mice. The inhibition of sweating was evident as a discount or absence of sweating on the foot injected with the anticholinergic compound (Table 2).

Table 2. The anticholinergic and antimuscarinic effect of *C. ternatea* ethanol extract.

Sl. No	Group	Drugs	Action
1	Control	0.9%NaCl	sweat formed
2	Standard	0.9%+glycopyrrolate	control
3	Standard	0.9%+scopalamine	control
4	Test drug	0.9%+extract of *C. ternate* leave	control

While the contralateral foot sweated uniformly. When a very high dose of the anticholinergic agent was injected, a systemic effect was evident within the sort of failure to sweat on the injected foot. The IC_{50} values and their 95 % confidence limits for the quality extract solution of *C. ternatea* and for duplicates trails with four compounds are compared in sweat inhibitor. The mouse foot screen for sweat inhibition by anticholinergic drugs permits the comparison of the activity of the inhibitors directly upon the sweat glands bypassing cutaneous barriers. The info obtained is superior to the standard rank-order estimate of activity provided by most tests for sweat inhibition because they allow a determination of the potency ratio with reference to a typical. Since the test described here is meant only to pick compounds for further evaluation, many considerations which might apply to a definitive study of agonist-antagonist relationships aren't relevant. The interval between test solution and extract of *C. ternatea* leave administration and between extract of *C. ternatea* leave solution injection and reading the sweat inhibition may be a matter of convenience. If inhibitory activity reaches a peak then dissipates before reading the response or if the onset of activity is extremely slow. The mouse foot screen for sweat inhibition are often used to pick for further study suitable compounds for the topical or systemic control of hyperhidrosis the extract of leaves of *C. ternatea* regulates the surplus sweat of the mice.

CONCLUSION:

From the above study, it was concluded that the *Clitoria ternatea* is a useful powerful source for sweat inhibition due to its anticholinergic effect which permits to identifying inhibitory activity directly upon the sweat gland, bypassing cutaneous barriers.

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