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An Experimental Study on Phytochemical Screening and In-Vivo Antipyretic activity of *SCUTIA MYRTINA* leaves

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ABSTRACT

The dynamics of the consumer market evolved with globalization. But among its long-term impacts are changes in diet and lifestyle. Research in the chemical and pharmaceutical sciences has led to the development and discovery of medicines that have saved millions of lives. However, extended use of these drugs has raised questions about their safety and potential toxicological consequences. To validate their traditional usage, researchers examined the herbs that were previously used in Chinese and Ayurvedic medicine. As a result, communities' reliance on complementary and alternative medicines has started to resurrect during the previous several decades. Most often, synthetic medications like aspirin and paracetamol are used to treat fever. Numerous adverse consequences are linked to synthetic medications. Because they are easily accessible and have fewer side effects, herbal medications provide an alternate method of therapy. The purpose of this study was to ascertain the hydroalcoholic leaf extract of Scutia myrtina's antipyretic efficacy in albino rats. Because the plant extracts include potentially bioactive components, the current investigation shows that they have notable antipyretic action. Our studies also revealed that Scutia myrtina leaf hydroalcoholic extract had notable antipyretic effects that were dosage dependant.

KEY-WORDS Pyrexia, Phytochemistry, Alkaloids, Paracetamol, Anorexia

INTRODUCTION

Common medical symptoms like sadness, drowsiness, lethargy, hyperalgesia, anorexia, and so on are frequently present together with fever, which is largely connected with an increase in body temperature. Fever is typically accompanied by a range of medical diseases, including infections, skin irritation, immunological disorders, cancer, metabolic abnormalities, and reactions to incompatible blood products. The brain's hypothalamus regulates the heat effector mechanism through the autonomic nervous system, either by increasing the generation of heat (by shivering or increased muscular tone) or by preventing heat loss by vasoconstriction. There is controversy regarding the usefulness of fever; however, high temperature is always considered a medical emergency due to its serious side effects such as intracranial haemorrhage, sepsis, Kawasaki syndrome, thyroid storm, and serotonin syndrome.[1] The search for an ideal antipyretic drug is a never-ending challenge. Paracetamol and other popular synthetic antipyretic drugs have several side effects. [2] Therefore, it is worth searching for herbal materials that are equally efficacious but less toxic and comparatively free from side effects, as substitutes for synthetic drugs such as paracetamol.

Herbal medicine has been utilized for medicinal purposes since ancient times. Their plethora of medicinal properties, which may contribute to the averting of ailments, have made them highly valued throughout. With good reason, China and India are known as the "Botanical Garden of the World" since they are the world's leading producers of medicinal plants. India holds a unique position in the world since it is the cradle of several well recognized traditional medicinal systems, such as homeopathy, yoga, naturopathy, Siddha, and Unani. [3]

Scutia myrtina, also known as S. myrtina, is an evergreen shrub that grows to a height of 75 to 80 cm with a trunk diameter of up to 30 cm. It is branching, glabrous, or sparsely hairy. It can also be a scandent, thorny liana climber. It is a member of the Rhamnaceae family. The younger plant is glabrous with green, sharp branchlets, whereas the older bark is black, corky, and septate lengthwise. Previous research suggests that the aerial section of S. myrtina can be used to treat salpingitis, a stomach ailment. The leaves and roots are said to have antihelminthic properties in the traditional medical system. There has antiviral action in the aerial component extract. The bark and root of *S. myrtina* can cure common fever, while the plant's decoction is used as medication for malaria. The leaves and bark extract can cure schistosomiasis, gonorrhea, and intestinal worms. The plant ethanol and petroleum ether extract exhibits substantial antimicrobial and anti-inflammatory properties . The anthraquinones of *S. myrtina* have significant anti-malarial and antiproliferative effects. [4]

MATERIAL AND METHODS

Gathering of Botanical Specimens

The leaves of the Scutia Myrtina plant were collected from a nearby region in Tamil Nadu based on geographic availability, and they were then cleaned with tab water and let to dry at room temperature. The materials were crushed and put through a 20-mesh

filter once they had dried. The powdered drugs were kept out of direct sunlight and kept in sealed containers until needed.

Extraction of plant material

The appropriate volume of air-dried powdered plant material was added to the Soxhlet apparatus, starting with petroleum ether and working up to hydroalcohol (ethanol: water; 75:25) for the powdered Scutia Myrtina leaves. Every time, the powdered material was removed and replaced with the next dissolvent compound once it had been air dried below 100oC. At 100oC, the extracted solvent was allowed to evaporate in the water bath. After the evaporation, the collected components were stored in a refrigerator for further analysis.

Table 1: Phytochemicals test[5]

Phytochemical	Test	Procedure
Alkaloids	Dragendroff's Test	The filtrates were subjected to a solution of potassium bismuth iodide, known as Dragendorf's reagent. The presence of alkaloids is shown by the formation of red precipitate.
Glycosides	Legal's Test	Sodium nitropruside was used to treat the extract with pyridine and sodium hydroxide. The presence of cardiac glycosides is indicated by the formation of a pink to blood red color.
Flavonoids	Alkaline Reagent Test	A few drops of sodium hydroxide solution were added to the extract. Flavonoids are indicated by the formation of a bright yellow color that becomes colorless when diluted acid is added.
Saponins	Froth Test	After diluting the extract with 20ml of distilled water, it was agitated for 15 minutes in a graduated cylinder. The presence of saponins is indicated by the formation of a 1 cm layer of foam.
Tannins	Gelatin Test	A 1% sodium chloride-containing gelatin solution was added to the extract. The presence of tannins is shown by the formation of white precipitate.
Phenols	Ferric Chloride Test	Three to four drops of ferric chloride solution were added to the extract. Phenols are present when blue black color begins to form.
Proteins and Amino acids	Xanthoproteic Test	A little amount of concentrated nitric acid was added to the extract. The development

		of a yellow hue signifies the existence of proteins.
Carbohydrates	Molisch's Test	In a test tube, filters were treated with two drops of an alcoholic α-naphthol solution. The presence of carbohydrates is shown by the formation of the violet ring at the junction.

In vivo* antipyretic activity of *Scutia myrtina

Animals:-

Albino Wistar rats weighing 150–200 g, regardless of sex, were kept in groups of six in controlled environments with a regular 12-hour light/dark cycle and 25±2 ℃ (55–65%) percent humidity. Water was available at all times, along with conventional rat feed. Prior to doing the studies, the animals were given seven days to become used to the laboratory environment. Every experiment was conducted from 8:00 to 15:00 h in a quiet room. For every series of trials, a different group of six rats was employed. The Ministry of Environment and Forests, Government of India, New Delhi, India, established the Institutional Animal Ethics Committee (IAEC) to oversee and regulate the use of experimental animals. The IAEC granted approval for the animal experiments.

Acute oral toxicity study

The Organization for Economic Cooperation and Development's methodology was used for conducting the study on acute oral toxicity. Six groups of rats (n = 6) were given hydroalcoholic extract of Scutia myrtina leaves at doses of 5, 50, 300, and 2000 mg/kg orally for four days. The rats were observed for signs of mortality and behavioral changes to assess any potential anti-pyretic effect (OECD, 2000).

Two tests were chosen for pharmacological screening based on the maximum tolerated dosage limit (MTD) based on the acute toxicity research, since no fatality was shown up to 2000 mg/kg. Ultimately, a subset of dosages (2000 mg/kg) were selected for further pharmacological research.Body weights of the animals were recorded and they were randomly divided into 5 groups of 6 animals each as follows:

Group I served as normal saline

Group II served as control- animals were treated with yeast via subcutaneous injection (10ml/kg).

Group III animals were administered with yeast (10ml/kg) and the standard drug paracetamol (150mg/kg b.w.), orally

Group IV animals were administered with yeast (10ml/kg,) and with hydroalcoholic extract of leaves of *Scutia myrtina* (100mg/kg b.w.), orally

Group V animals were administered with yeast (10ml/kg,) and with hydroalcoholic extract of leaves of *Scutia myrtina* (200mg/kg b.w.), orally.

Yeast induced pyrxia

A subcutaneous injection of 20% w/v brewer's yeast (10 ml/kg) in distilled water was used to cause pyrexia. Prior to the yeast injection, the basal rectal temperature was

ascertained by inserting a digital clinical thermometer two centimeters into the rectum. Eighteen hours after the yeast injection, the rectal temperature started to increase. An antipyretic medication of 150 mg/kg body weight was the norm. Animals' rectal temperatures were recorded on a regular basis after the appropriate treatments. Three hours after the medicine was administered, the temperature was taken. [6]

RESULT AND DISCUSSION

Table 3 illustrates how Scutia myrtina leaf hydroalcoholic extract treats yeast-induced pyrexia. In mice inoculated with yeast, treatment with a hydroalcoholic extract of Scutia myrtina leaves at doses of 100 and 200 mg/kg body weight and 150 mg/kg of paracetamol reduced body temperature in a dose-dependent way. Following the extract's administration, the antipyretic effect began to take action during the first hour and persisted for three hours. The outcomes from the groups treated with standards and extracts were contrasted with those of the control group. With the test medication, there was a noticeable drop in the increased rectal temperature caused by yeast.

The current findings demonstrate that both extracts have a strong antipyretic effect in mice that have had their body temperatures elevated by yeast, and that this effect is similar to that of the prescription medication paracetamol. Therefore, suppression of prostaglandin production may be the same mechanism by which paracetamol has its antipyretic effects. Additionally, there are several mediators or multiprocesses that support fever pathogenesis. Any of these mediators that are inhibited may have an antipyretic effect. A complex physiological reaction brought on by an infection or aseptic stimuli is known as a fever (pyrexia).

When PGE2 builds up in the preoptic area of the hypothalamus, the body temperature rises. The neurons firing rate in the hypothalamus control thermoregulation and is usually altered by increased synthesis of PGE2. Research has reported that most antipyretic drugs exert their action by inhibiting cyclooxygenase enzymatic activity and consequently reducing PGE2 levels within the hypothalamic region. However, other different mechanisms in the management of pyrexia cannot be ruled out61-62 . Antipyretics are the agents which reduce the elevated body temperature. Regulation of body temperature requires a delicate balance between the production and loss of heat, and the hypothalamus regulates the set point at which body temperature is maintained.

The results of the current investigation show that the plant extracts' remarkable antipyretic efficacy is caused by the presence of possibly bioactive chemicals in them. Our studies also revealed that Scutia myrtina leaf hydroalcoholic extract had notable antipyretic effects that were dosage dependant. Given that these plant parts are utilized in traditional medicine, it is important to do scientific research on the phytochemical profiles of the extracts. This will allow future studies to identify and isolate the active ingredients that are responsible for the pharmacological effects.

Table 2: Preliminary phytochemical tests results of *Scutia myrtina*

Phytochemical	**Test**	**Result**
Alkaloids	Dragendroff's Test	- ve
Glycosides	Legal's Test	+ ve
Flavonoids	Alkaline Reagent Test	+ ve
Saponins	Froth Test	+ ve
Tannins	Gelatin Test	- ve
Phenols	Ferric Chloride Test	+ ve
Proteins and Amino acids	Xanthoproteic Test	- ve
Carbohydrates	Molisch's Test	- ve

Table 3; Antipyretic activity of hydroalcoholic extract of leaves of *Scutia myrtina* against yeast induced pyrexia in rats

Rectal Temperature in °C after 18hrs of Yeast Injection				
Group	0 hour	1 hour	2 hour	3 hour
Group I **(**Normal Control)	38.60±0.80	38.40±0.80	38.70±0.6	38.20±0.70
Group II **(**Control yeast via subcutaneous injection (10ml/kg)	42.70±0.10	41.60±0.10	40.80±0.11	40.60±0.11
Group III Standard drug paracetamol (150mg/kg b.w.)	40.90±0.12	39.80±0.12	39.20±0.12 *	38.40±0.11 *
Group IV **(**Hydroalcoholic extract of leaves of *Scutia myrtina* (100mg/kg b.w.)	41.20±0.12	40.40±0.12	39.80±0.11	39.30±0.11 *
Group V (Hydroalcoholic extract of leaves of *Scutia myrtina* (200mg/kg b.w.)	41.60±0.12	40.40±0.12	39.30±0.12 *	38.70±0.11 *

CONCLUSION

Based on the current study, it can be said that Scutia myrtina leaf hydroalcoholic extract possesses antipyretic properties. It is possible to consider all of these biological processes to be encouraging results of the current investigation. These

contributions can serve as criteria for both the plant's authentication and the development of novel medications that take use of their activities. No attempt was made to determine the mechanism behind the antipyretic action that was reported in this investigation. On the other hand, it is possible that it is operating via one of the two central or peripheral mechanisms listed above. Additionally, it's feasible that both systems are at play. In our lab, more research on the identification and isolation of the chemical ingredient causing the antipyretic action is now being planned.

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