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# EVALUATION OF ANTIPYRETIC ACTIVITY OF METHANOLIC LEAVES EXTRACT OF *ABUTILON GRANDIFOLIUM* PLANT

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## ABSTRACT

The goal of the present pharmacological study is to ascertain if methanol extract from *Abutilon grandifolium* leaves may protect albino rats against yeast-induced pyrexia. Each of the six animals was split up into four groups for the experiment. First, the yeast-induced pyrexia process was standardized by injecting 15% yeast suspension (s.c.). The rectal temperature was thereafter taken on a regular basis. The anti-pyretic effectiveness of *Abutilon grandifolium* leaf methanolic extract (250 mg/kg & 500 mg/kg) was then evaluated using this established procedure. In experimental rats, the plant extract *Abutilon grandifolium* exhibited a noteworthy ($P<0.01$) antipyretic activity when the rats' body temperature was elevated by yeast. The information gathered during the investigation demonstrates the strong antipyretic activity of *Abutilon grandifolium*.

**Keyword**: *Abutilon grandifolium*, Yeast induced pyrexia

## 1. INTRODUCTION

A fever, often called pyrexia, is characterized by an increase in body temperature. It is a reaction brought on by inflammation, cancer, transplant rejection, or tissue injury. Under these circumstances, a large number of cytokines, interleukin, interferon, and tumor necrosis factor α (TNF-α) are generated. These increase PGE2, and the hypothalamus raises body temperature as a result. A fever is defined as a temperature that goes beyond 38.3ºC (100.9ºF) and lasts for longer than three weeks after a sufficient investigation but no obvious explanation is found. It is an active process that is resistant to changes in the environment and is

pathologically increased above normal body temperature. Fever is not a particular ailment; rather, it is only one of several symptoms. Naturally occurring instances of elevated body temperature include physical effort and hyperthermia brought on by extended exposure to heat. Usually, a fever denotes a physical infection. Among the most common diseases, especially among preschool-aged children, are colds and the flu. Fever is most commonly caused by viruses, although it can also be caused by bacteria. Viral infections are common and do not necessitate the use of antibiotics. Bacterial infections are usually treated with antibiotics. It is the natural defense system of the body against illness. Treating a fever is usually not necessary because fevers are not hazardous in and of themselves. Fever is associated with indications of illness behavior, including depression, sluggishness, anorexia, somnolence, and difficulties focusing. This elevation in set point causes shivering and an increase in muscle tone. However, antipyretic medications work well to lower fever, which may also make the ill person feel more comfortable.

## 2. Material and Method

### 2.1 Collection of plant material

Leaves of *Abutilon grandifolium* were collected from Vindhya herbal nursery of Bhopal (M.P), India in the months of September, 2023.

### 2.2 Extraction procedure

Plant materials (leaves) selected for the study were washed thoroughly under running tap water and then were rinsed in distilled water; they were allowed to dry for some time. Then these plants materials were shade dried without any contamination for about 3 to 4 weeks. Dried plant materials were grinded using electronic grinder. Dried plant material was packed in air tight container till any further use. 70 gm dried powdered seeds of *Abutilon grandifolium* has been extracted with Methanol as solvent using maceration process for 24 hrs, filtered and dried using vaccum evaporator at $40^0$C. The percentage yield of each extract was calculated by using following formula:

$$\text{Percentage yield} = \frac{\text{Weight of Extract}}{\text{Weight of powder drug Taken}} \times 100$$

### 2.3 Phytochemical Screening

The *Abutilon grandifolium* extract acquire was subjected to the precursory phytochemical analysis following standard methods by Khandelwal and Kokate. The extract was screened to identify the presence of various active principles of alkaloids, glycosides, phenols, flavonoids, Terpenoids, Saponins, Steroids.

### 2.4 Estimation of total Phenolic, flavonoid and alkaloid Content

#### 2.4.1 Total Phenolic content estimation

The total phenolic content of the extract was determined by the modified Folin-Ciocalteu method. 10 mg Gallic acid was dissolved in 10 ml methanol, various aliquots of 5- 25µg/ml was prepared in methanol.10 mg of dried extracted dissolve in 10 ml methanol and filter. Two ml (1mg/ml) of this extract was for the estimation of phenols. 2 ml of extract or standard was mixed with 1 ml of Folin-Ciocalteu reagent (previously diluted with distilled water 1:10 v/v) and 1 ml (7.5g/l) of sodium carbonate. The mixture was

vortexed for 15s and allowed to stand for 15min for colour development. The absorbance was measured at 765 nm using a spectrophotometer.

### 2.4.2 Total flavonoids content estimation

Determination of total flavonoids content was based on aluminium chloride method.10 mg quercetin was dissolved in 10 ml methanol, and various aliquots of 5- 25µg/ml were prepared in methanol. 10 mg of extract dissolved in 10 ml methanol and filter. Three (1mg/ml) of this extract was for the estimation of flavonoid. 1 ml of 2% $AlCl_3$ methanolic solution was added to 3 ml of extract or standard and allowed to stand for 15 min at room temperature; absorbance was measured at 420 nm.

### 2.5 *In Vivo* antipyretic activity

Wistar rats (150–200 gm) were group housed (n= 6) under a standard 12h light/dark cycle and controlled conditions of temperature and humidity (25±2°C, 55–65%). Rats received standard rodent chow and water *ad libitum*. Rats were acclimatized to laboratory conditions for 7 days before carrying out the experiments. All the experiments were carried in a noise-free room between 08.00 to 15.00 h. Separate group (n=6) of rats was used for each set of experiments. Preliminary experiments were carried out on rats (n=6). Methanolic extract of leaves of *Abutilon grandifolium* were administered orally in different doses to find out the range of doses which cause zero and 100 % mortality of animals. Animals were kept fasting providing only water, extract were given p.o. in doses of 500, 1000 and 2000 mg/kg/p.o. administered orally for 4 days of different groups of rats (n=6) and the animals were kept under observation for mortality as well as any behavioral changes for evaluation of a possible antipyretic activity.

The antipyretic activity was evaluated with fever induced by Brewer's yeast following the established method in rats with some modifications. At zero hour, the basal rectal temperature of each rat was recorded using clinical digital thermometer. Pyrexia was induced by subcutaneous injection of 15% w/v suspension of Brewer's yeast in distilled water at a dose of 10 mL/kg body weight. After 18 hr of Brewer's yeast injection the rise in rectal temperature was recorded and only animals showing an increase in temperature of at least 0.6°C (or 1°F) were selected for the study. The animals were randomly divided into six groups, each group containing five rats.

**Group I** received 1% Tween-80 in normal saline orally.

**Group II** was given standard drug paracetamol at the dose of 100 mg/kg per orally.

**Groups III** received methanolic extract of leaves of *Abutilon grandifolium* at oral dose of 250 mg/kg.

**Groups IV** received methanolic extract of leaves of *Abutilon grandifolium* at oral dose of 500 mg/kg.

To determine the antipyretic activity each group of rats was treated with the respective dose. Group II served as standard and received orally 100 mg/Kg body wt. of paracetamol. Group III & IV animals were fed with test drug of Abutilon grandifolium at dose of 250, and 500 mg/Kg body weight. The rectal temperature was recorded at hourly interval for a period of 3 hours after administration of the drug. After the treatment, the temperature of all the rats in each group was recorded at 0 hr, 1 hr, 2 hr, 3 hr, and 4 hr.

# 3. RESULTS AND DISCUSSION

## 3.1 Result of Percentage Yield

**Table 3.1: % Yield of Methanolic extract of *Abutilon grandifolium***

| S. No. | Part | % Yield (W/W) |
|---|---|---|
| 1. | Leaves | 4.37% |

## 3.2 Result of Phytochemical screening

The preliminary phytochemical screening of the methanolic extracts of *Abutilon grandifolium* revealed the presence of secondary metabolites such as alkaloids, saponins, terpenoids, flavonoids, tannins, steroids and reducing sugars. The outcomes of the results are discussed separately in the table 3.2

**Table 3.2: Phytochemical screening of methanolic extract of *Abutilon grandifolium***

| S. No. | Constituents | Methanolic extract |
|---|---|---|
| 1. | **Alkaloids** | |
| | Dragendroff's test | **+ve** |
| | Hager's test | **+ve** |
| 2. | **Flavonoids** | |
| | Lead acetate | **+ve** |
| | Alkaline test | **+ve** |
| 3. | **Phenolics** | |
| | $Fecl_3$ | **+ve** |
| | Gelatin Test | **-ve** |
| 4. | **Proteins and Amino acids** | |
| | Xanthoproteic test | **+ve** |
| | Ninhydrin Test | **+ve** |
| | Millon's Test | **+ve** |
| 5. | **Carbohydrates** | |
| | Fehling's test | **+ve** |
| | Benedict's Test: | **+ve** |
| | Killer Killians Test | **-ve** |
| 6. | **Saponins** | |
| | Foam test | **+ve** |
| 7. | **Diterpenes** | |
| | Copper acetate test | **+ve** |
| | Burchards Test | **+ve** |

| | | |
|---|---|---|
| **8.** | **Tannins**<br>**5% fecl$_3$ test** | **+ve** |

### 3.3 Results of Estimation of Total Phenolic and Total flavonoid content

**Table 3.3: Total Phenolic and Total flavonoid content of extract of *Abutilon grandifolium***

| S. No. | Extract | Total Phenol (GAE) (µg/100 µg) | Total flavonoid (QE) (µg/100 µg) |
|---|---|---|---|
| **1.** | **Methanolic extract** | 1.874 ± 0.240 | 0.973 ± 0.371 |

### 3.4 Results of Antipyretic activity of methanolic Leaves extract of *Abutilon grandifolium*

The plant extract's antipyretic potency was evaluated utilizing the Brewer's yeast-induced pyrexia paradigm. Four experimental groups were randomly assigned to albino rats. A digital thermometer was inserted into the anal cavity of the albino rats and left there for approximately one minute in order to measure their standard body temperatures. The observed rectal temperature readings were noted as either normal body temperature or pre-treatment values. After that, 15% brewer's yeast (Saccharomyces cerevisiae) suspension was subcutaneously injected beneath the nape of the neck to cause pathogenic fever in albino rats. A second measurement of the rectal temperatures of all the albino rats was taken 24 hours later. The dosage adjustment was 1 ml/kg. The study eliminated albino rats that did not exhibit a baseline increase in temperature of 0.3 °C. In our study, none of the albino rats was omitted due to the aforesaid criteria. Later on, group I was given sterile NS 10 ml/kg; group II received standard drug paracetamol 150 mg/kg; and group III, IV, and V were given plant extract 50, 100, and 200 mg/kg, via i.p. route of administration, respectively. Rectal temperature was then noted directly at 0 h and after 1, 2, 3, and 4 h post drug treatment

Antipyretic effects of methanolic extract of leaves of *Abutilon grandifolium* on rectal temperature are presented in Table. The subcutaneous injection of yeast markedly increased the rectal temperature and the mean increment recorded was 1.24–2°F after 18 hr of administration. The extract and paracetamol treatment groups showed significant effect on rectal temperature with significant reduction of temperature over period of time from 1 hr to 4 hr. Methanolic extract of leaves of *Abutilon grandifolium* at the dose of 250 mg/kg and 500 mg/kg body weight significantly attenuated hyperthermia in rats in 1 hr observation and lowering of temperature was even more significant from 2 hr to 4 hr observation period in comparison to control. Standard drug paracetamol also significantly inhibited pyrexia in early and latter hours of observation time intervals. The different treatment methanolic extract of leaves of *Abutilon grandifolium* and paracetamol lowered the rectal temperature in time dependent manner.

**Table 3.4: Antipyretic effect of Methanolic extract of leaves of *Abutilon grandifolium* in yeast induced pyrexia in rats**

| Treatment | Dose (mg/kg) | Basal temp. °F | Rectal temperature (°F) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 0 hour (after 18 hr) | 1 hr | 2 hr | 3 hr | 4 hr |
| Control | 15% w/v suspension of Brewer's yeast (10 mL/kg) | 99.0 | 100.5 ± 0.3 | 101.2 ± 0.1 | 101.5 ± 0.1 | 100.7± 0.1 | 100.6 ± 0.1 |
| Paracetamol | 100 mg/kg | 98.50 | 100.5 ± 0.3 | 99.2 ± 0.1 | 99.0± 0.2 | 98.6 ± 0.1 | 98.6± 0.3 |
| Methanolic leaves extract *Abutilon grandifolium* | 250mg/kg | 98.50 | 100.5 ± 0.3 | 100.1 ± 0.2 | 99.6 ± 0.2 | 99.2 ± 0.2 | 98.8 ± 0.2 |
| Methanolic leaves extract *Abutilon grandifolium* | 500mg/kg | 98.50 | 100.5 ± 0.3 | 99.7± 0.2 | 98.9 ± 0.2 | 98.6 ± 0.2 | 98.5 ± 0.2 |

Yeast induced fever, which represents pathogenic fever, presents an economical and reliable method for assessing new antipyretics. The presence of proteins in yeast is linked to fever via inflammatory reaction in this method. Further, the production of proinflammatory cytokines such as interleukin-1β (IL-1β) and IL-6, interferon-α (IFN-α), and tumor necrosis factor-α (TNF-α) and prostaglandins like PGE2 and PGI2 are responsible for elevating the body temperature by acting on brain.

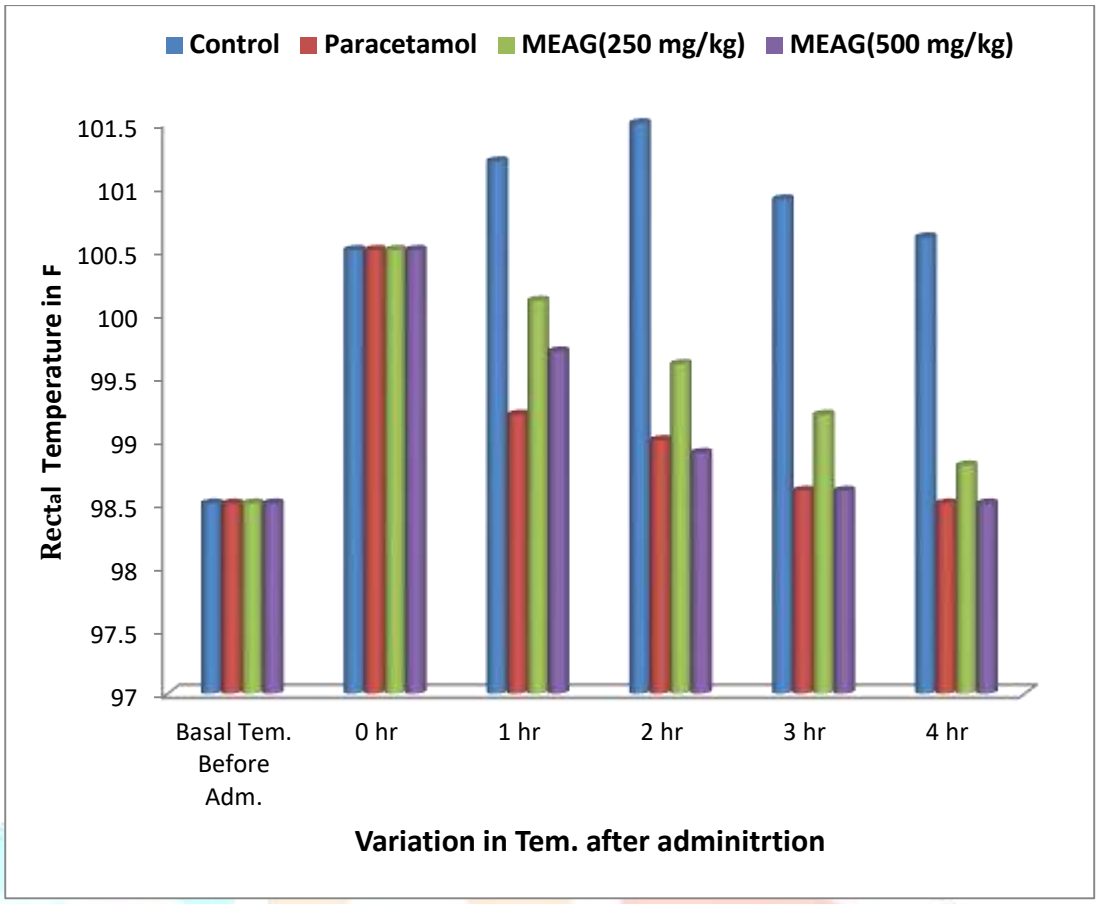


**Figure 3.1: Antipyretic effect of methanolic extract of leaves of *Abutilon grandifolium* in yeast induced pyrexia in rats**

## CONCLUSION

The present investigation it may be concluded that the methanol extract of *Abutilon grandifolium* leaves have antipyretic activity. In this study no attempt was made to ascertain the mechanism of the observed antipyretic activity. However, it can be suggested that it may be acting through either the peripheral or central mechanism enumerated above. It is also possible that both the mechanisms may be involved. Further, study regarding isolation and characterization of active principle responsible for antipyretic activity are under planning in our laboratory. The extracts were subjected to qualitative phytochemical screening using standard procedure. Phytochemical screening reveals the presences of Alkaloids, Tannin, flavonoids, phenolics, saponins carbohydrates, diterpenes. The Antipyretic effect of methanolic leaves extract of *Abutilon grandifolium* significantly lowered the temperature in yeast induced pyrexia. The lowering of temperature was almost in a similar manner to that of reference drug, paracetamol, suggesting that the plant have antipyretic property which can be assumed to be mediated through interference of prostaglandin synthesis and inhibition of cytokines release. The conclusion of the study demonstrated that of Methanolic leaves extract of *Abutilon grandifolium* displayed antipyretic property.

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