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ANTIPYRETIC ACTIVITY OF *IPOMOEA SEPIARIA*, *MOMORDICA CYMBALARIA* AND *PERGULARIA DAEMIA* EXTRACTS ON YEAST-INDUCED PYREXIA IN RATS

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Abstract

Plants have been used for medicinal purposes long before recorded history. The present study was aimed at screening of some folklore plants of Rayalaseema of Andhra Pradesh for antipyretic activity. Pyrexia was induced in wistar rats by subcutaneous injection of yeast. Two groups of six pyrexia rats, whose rectal temperature raised above 1.2^0c or more were challenged orally with ethanol extracts of *Ipomoea sepiaria, Momordica cymbalaria and Pergularia daemia* at 250 mg/kg body weight and 500 mg/kg body weight respectively. Third group of pyrexia rats were treated with aspirin to serve as positive control. Anti-pyretic activity of above plants were studied by recording rectal temperatures at 60, 90,150 and 180 minutes after administration of extracts. All three plants exhibited significant anti-pyretic activity.

Keywords: Antipyretic activity, *Ipomoea sepiaria, Momordica cymbalaria, Pergularia daemia.*

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INTRODUCTION

Herbal medicines have been used by all cultures across the world. As per WHO report, despite of rapid growth of modern medicine, nearly 80% of global population rely on traditional therapies for primary health care. It is estimated that nearly two thirds of herbal drugs and around 25% of modern synthetic drugs used world over are discovered following leads from traditional medicine. Further, the wide spread belief of greater safety and affordability of herbal drugs over synthetic ones has driven many pharmaceuticals to invest large amounts on traditional research to isolate and formulate potential phytochemical active components for different ailments [1]. It is well known that most of the injuries and inflammatory diseases are accompanied by pain and fever. Most commonly Non-steroidal anti-inflammatory drugs (NSAIDs) are used for management of these symptoms. But long term administration of NSAIDs are reported to cause gastrointestinal disorders, bleeding and renal malfunction [2]. Though many plants with antipyretic capabilities have been reported [3,4], development of drugs with minimal or no side effects is still elusive. Following leads from local traditional healers, the present study is taken up to screen the following plants i.e., whole plant of *Ipomoea sepiaria* (Convolvulaceae), fruits of *Momordica cymbalaria* (Cucurbitaceae) and whole plant of *Pergularia daemia* (Asclepiadaceae) for potential antipyretic activity.

MATERIALS AND METHODS

PLANT MATERIAL: After collection and identification, the whole plant of *Ipomoea sepiaria,* fruits of *Momordia cymbalaria* and whole plant of *Pergularia daemia* were dried under shade and powdered with a mechanical grinder to obtain a coarse powder. This powder was extracted with 95% ethanol (v/v) in soxhlet apparatus at 60^0c. The solvent is removed completely by rotary vacuum evaporator and extract is stored in vacuum desiccator to be used in the present investigation.

ANIMALS: Wistar strain albino rats of either sex, weighing 140-160g were used. Rats were maintained under regulated conditions (22 ± 2^0c and 12h light/dark cycle). They were fed with Hind Lever pellet diet and tap water *ad libitum*. Animals were fasted for 18h prior to experimentation but water *ad libitum* was provided.

YEAST-INDUCED PYREXIA: Basal rectal temperature was recorded by inserting thermometer to a depth of 2 cm in the rectum of rats. A 15% Brewer's yeast in 0.9% saline was injected subcutaneously below the nape of neck at a dose of 2ml/kg body weight. The injection site was

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massaged to ensure the spread of suspension below the skin. After 20h following injection the rise in rectal temperature was recorded. Only those rats, whose rectal temperature raised more than 1.2^0c were included for present study and were considered pyrexia rats. Such pyrexia rats were divided in to four groups of six each. First group served as control. Second and third groups were orally challenged with ethanol extract of each plant at 250mg/kg body weight and 500mg/kg body weight respectively. Fourth group was treated with aspirin (200mg/kg body weight) to serve as positive control. Rectal temperatures of all groups were recorded at 60, 90, 150 and 180 minutes after injection of plant extract or aspirin (Table 1). The experimental Protocol was approved by Institutional animal ethics committee (IAEC), Yogi Vemana University, Kadapa (Letter No. YVU/IAEC/AVR/14/2017) with CPCSEA Registration No. 1841/Go/ Re/S/15. Moreover animals were not sacrificed at the end of the study. Data was analyzed by student's t-test for statistical significance.

RESULTS AND DISCUSSION

The results clearly demonstrated significant antipyretic activity of ethanol extracts of *Ipomoea sepiaria (*IS*), Momordia cymbalaria (*MC*) and Pergularia daemia (*PD*)* in brewer's yeast-induced pyrexia rats. Though all three plants showed antipyretic effect, the IS registered more pronounced effect when compared to MC and PD. Again dose dependent activity was noticed with higher doses (500mg/kg body weight) proved more effective when compared with lower dose treated rats in all plants (Table 1).

Table 1: Effect of Plant extracts (250 and 500 mg/kg body weight) and Aspirin (200mg/kg body weight) given orally to rats with yeast induced pyrexia

Group	Dose (mg/kg)	Rectal Temperature (^{0}C)					
		Normal Rats (0 hr)	Yeast Induced Pyrexia Rats (20 hr)	After Treatment with extract			
				60 min (21 hr)	90 min (21.5 (hr)	150 min (22.5 hr)	180 min (23.0 hr)
Control	yeast	37.01±0.06	38.40±0.10	38.46±0.09	38.52±0.09	38.48±0.11	38.56±0.08
I. sepiaria	500	37.16±0.71	38.46±0.08	34.02±0.08	34.22±0.07	36.57±0.04	37.01±0.03
I. sepiaria	250	37.09±0.04	38.42±0.05	35.92±0.07	35.56±0.06	36.20±0.07	36.94±0.05
Aspirin	200	37.14±0.05	38.70±0.06	36.08±0.04	36.52±0.08	36.98±0.04	37.14±0.05
Control							
M. cymbalaria	yeast 500	37.00±0.12 36.96±0.24	38.56±0.02 38.62±0.09	38.90±0.09 35.60±0.18	38.24±0.14 36.71±0.12	38.42±0.05 36.98±0.07	38.46±0.04 37.62±0.14
M. cymbalaria	250	37.40±0.09	38.62±0.05	36.00±0.24	37.01±0.13	37.26±0.06	37.52±0.09
Aspirin	200	37.16±0.08	38.71±0.07	37.01±0.08	37.20±0.04	37.24±0.03	37.50±0.08
Control	yeast	37.02±0.16	38.72±0.03	38.68±0.26	38.76±0.33	38.72±0.04	38.74±0.19
P. daemia	500	36.98±0.24	38.52±0.29	35.60±0.18	35.72±0.20	36.94±0.32	37.10±0.32
P. daemia	250	37.00±0.20	38.80±0.09	36.62±0.08	36.98±0.24	37.40±0.14	37.20±0.20
Aspirin	200	37.04±0.14	38.74±0.09	37.14±0.10	37.42±0.08	37.18±0.09	37.15±0.08

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Each value is mean ± SD of six individuals
Values are significant at P <0.001)

Rectal temperatures of all pyrexia rats were dropped significantly after 60 minutes and slowly increased through 90 minutes and 150 minutes with complete restoration of normal temperatures by 180 minutes in all plant groups. It is clearly demonstrated the effectiveness and early action of plant extracts in all test animals (Fig 1a, 1b and 1c).

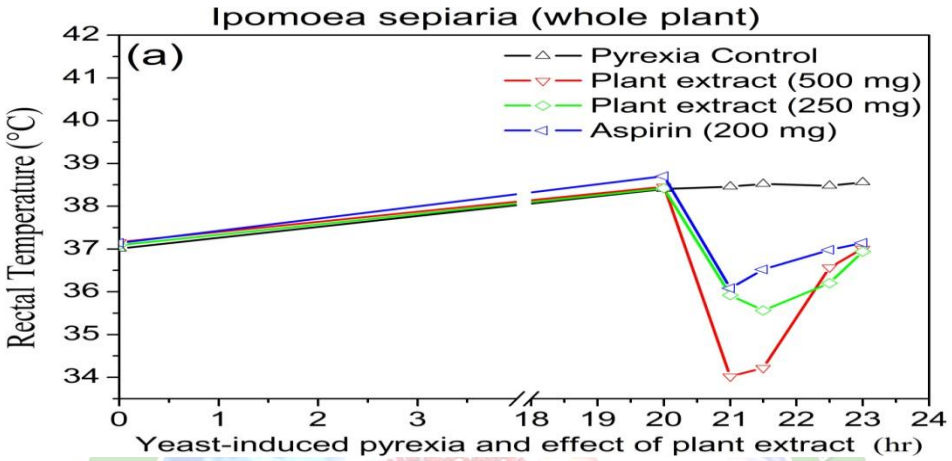

Fig. 1 (a): Effect of ethanol extract of *I. sepiaria* on yeast-induced pyrexia rats

Fever or pyrexia is a complex immunological response triggered by injury or infectious microorganisms. Over the years many herbs or plants with antipyretic ingradients have been well documented [3,4]. Phytochemical studies of anti-inflammatory and antipyretic activity of most herbal extracts ascribed to a phytochemical constituent salicylate. This indeed paved way for the development of wonder drug, aspirin, by acetylation of synthetic salicylate in 1897. But the precise mechanism of action of aspirin through inhibition of prostaglandin synthesis was document much later [5].

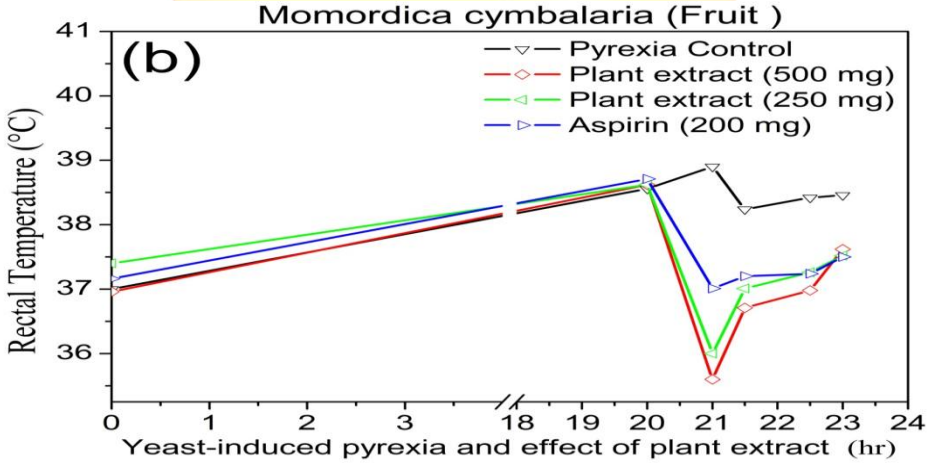

Fig 1 (b): Effect of ethanol extract of *M. cymbalaria* on yeast-induced pyrexia rats

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According to classical view, fever is induced by inflammatory cytokines i.e.,interleukin-1, interleukin-6, tumor necrosis factor etc., released by peripheral mononuclear macrophages and other immune cells [6,7]. These large hydrophilic cytokine proteins are transported through blood to reach brain. [8]. As brain is protected by tight blood-brain barrier system, these cytokines are reported to enter brain through circumventricular organs [9]. Once reaches brain, these cytokines interact with specific receptors present on brain endothelial cells [10] or perivascular tissue [11], initiating release of pyrogenic mediators by these cells. Within brain inflammatory mediators act on thermosensitive hypothalamic neurons to release prostaglandin E_2 (PGE_2) produced by cyclooxygenase (COX-**2**), resultingin elevation of body temperature [12]. PGE_2 is synthesized from arachidonic acid, which inturn is metabolised by two isoforms of oxygenase, COX-**1** and COX-**2**. Constitutively expressed COX-1 responsible for the production of prostaglandins concerned with homeostatic housekeeping functions [13]. But **COX-2**, an inducible isoform is upregulated by inflammatory mediators, IL-1, IL-6 and TNF-α etc.

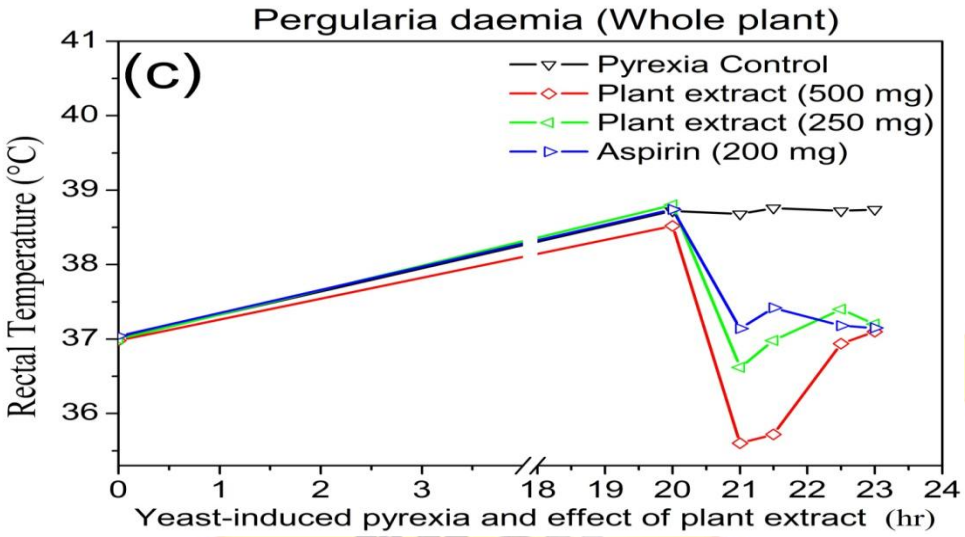

Fig 1 (c): Effect of ethanol extract of *P. daemia* on yeast-induced pyrexia rats

It is reported that, most antipyretic drugs interrupt with pyrexogenesis by reducing central production of PGE_2 by hypothalamus. Reducing pro-inflammation, enhancing anti-inflammatory signals at sites of injury or boostup antipyretic messages within brain are also reported as other mechanisms for action of antipyretic drugs [14].

In the present study ethanol extracts of IS, MC and PD showed significant antipyretic activity in yeast-induced pyrexia in rats. Though this study is a preliminary one aimed to screen the above plants for antipyretic activity, it can however be suggested that antipyretic constituents present in

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the test plants may interrupt with pyrexogenesis at any of the steps discussed above or due to yet unknown mechanism. The results have given impetus for further elaborative investigations on antipyretic constituents of these plants.

CONCLUSION

Reduction of rectal temperatures in Pyrexia rats within 60 minutes of ethanol extract treatment speaks early action and abundance of potential antipyretic constituents in all three test plants. Further phytochemical and pharmacognostic studies can be taken up for isolation and formulation of antipyretic principles in these plants.

REFERENCES

1. Tarasankar Maity, Nilanjan Pahari, Khokan Bera and Manas Chakraborty. Recent developments in Herbal drug research for global health care. World Journal of Pharmaceutical Research. 2013;2(4) : 838-854.
2. Tapiero H, Nguyen Ba G, Couvreur P and Tew KD. Polyunsaturated fatty acids (PUFA) and eicosanoids in human health and pathologies. Biomedicine and Pharmacotherapy. 2002; 56 (5): 215-222.
3. Mathew G, Lincy J and Naina SS. Evaluation of antipyretic and anti-inflammatory activity of seed extract of *Trigonella foenum graecum*. Journal of Chemical and Pharmaceutical Research. 2016;8(1):132-135.
4. Alam, MK, Ahmed S, Anjum S, Akram M, Shah SM, Wariss HM and Usmanghani K. Evaluation of antipyretic activity of some medicinal plants from Cholistan desert, Pakistan. Pak.J. Pharm Sci. 2016; 29(2) : 529-33.
5. Vane JR and Botting RM. New insights into the mode of action of anti-inflammatory drugs. Inflammation Research, 1995; 44(1): 1-10.
6. Zeisberger E. From humoral fever to neuroimmunological control of fever. J.Therm.Biol. 1999; 24: 287-326.
7. Roth J.Endogenous antipyretics. Clinical Chimica Acta. 2006; 371:13-24.
8. Banks WA, Plotkin SR and Kastin AJ. Permeability of the blood-brain barrier to soluble cytokine receptors. Neuro immunomodulation. 1995;2 : 161-5.
9. Roth J, Harre EM, Rummel C, Gerstberger R and Hubschle T. Signelling the brain in systemic inflammation: role of sensory circumventricular organs. Front Biosci. 2004; 9: 290-300.

DOI: 10.21276/IJIPSR.2018.06.06.700

10. Matsumura K and Kobayashi S. Signalling the brain in systemic inflammation: the role of endothelial cells. Front Biosci. 2004;9:2819-26.

11. Schiltz JC and Sawchenko PE. Signalling the brain in systemic inflammation: the role of perivascular cells. Front Biosci. 2003;8: 1321-9.

12. Kluger MJ, In: David M, Aronoff MD and Neilson EG. Antipyretics: Mechanisms of action and clinical use in fever suppression. American J. Medicine. 1998;111:304-15.

13. Simon LS In: David M, Aronoff MD and Neilson EG. Antipyretics: Mechanisms of action and clinical use in fever suppression, American J. Medicine. 1999; 111:304-15.

14. Aronoff DM and Neilson EG. Antipyretics : Mechanisms of action and clinical use in fever suppression. American J. Med. 2001; 111:304-15.