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Research Article

ANTIPYRETIC POTENTIAL OF POLYHERBAL AYURVEDIC PRODUCTS

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ABSTRACT

The role of traditional medicines in the solution of health problems is invaluable on a global level. As estimated by WHO, 80% population of under developed countries rely on traditional system of medicine. A large number of ethnic plants such as The aqueous extract of polyherbal (Sweertia chirata, Solanum xanthocarpum, Tinospora cortifolia, Operculina turpethum, Cyperus rotuntus, picrorrhiza curroa, Melia azadirachta) was evaluated for its antipyretic potential on Brewer's yeast induced pyrexia in albino rats. The extract, at dose of 200 mg kg^{-1} body wt. and 400 mg kg^{-1} body weight, produced significant ($p<0.001$) reduction in elevated body temperature in a dose dependent manner. The antipyretic effect of the extract was comparable to that of paracetamol(150 mg kg^{-1} body weight p.o), a standard antipyretic agent.

Keywords: Pyrexia, antipyretic, herbal drugs, fever

INTRODUCTION

India has century's old and rich heritage of medicinal & aromatic plant due to diversity in environment for curing human illness. The most common illness is fever which is pharmacological known as pyrexia characterized by elevation of temperature above the normal range of 36.5 0C to 37.5 0C. Fever is associated with symptoms of sickness behavior which consist of lethargy, depression, anorexia, sleepiness, & inability to concentrate. This increase in set point triggers increased muscle tone & shivering. However antipyretic medication can be effective at lowering the temperature which may include the affected persons comfort. Medicinal plants are the only easily accessible health care alternative for most of our population and traditional medicines remained a part of our integral health system

Poly herbal formulation that contains *Sweertia chirata, Solanum xanthocarpum, Tinospora cortifolia, Operculina turpethium, Cyperus rotuntus, Picrorrhiza curroa, Melia azadirachta*. The Sweertia chirata various parts of this plant, including the root, stem, flower, and leaves are recommended for separately. The root juice is given for the relief of fever in whole part of india. *Tinospora cortifolia* prepare Ayurvedic system of medicine for its general tonic, antiperiodic, anti-spasmodic, anti-inflammatory, antiarthritic, anti-allergic and anti-diabetic properties. The plant is used in ayurvedic, "Rasayanas" to improve the immune system and the body resistance against infections. The root of this plant is known for its antistress, anti-leprotic and anti-malarial activities. The beneficial effect of *Solanum xanthocarpum* on bronchial asthma are attributed to the depletion of histamine from bronchial and lungs tissue. *Melia azedarach* Nimbidin and sodium nimbidate possess significant dose dependent anti-inflammatory activity against carrageen in induced acute paw oedema in rats and formalin-induced arthritis. Antipyretic activity has also been reported and confirmed in nimbidin23. Oral administration of nimbidin demonstrated significant hypoglycaemic effect in fasting rabbits24. A significant antiulcer effect was observed with nimbidin in preventing acetylsalicylic acid, indomethacin, stress or serotonin-induced gastric lesions as well as histamine or cysteamine-induced duodenal ulcers. *Operculina turpethum* have shown that it possesses anti-inflammatory, anticancer, cytotoxic, antisecretory, ulcer protective, hepatoprotective, & antibacterial activities. Some preliminary clinical studies have reported laxative, anti-inflammatory, analgesic, anti-helminthes and anti-arthritic effects of its crude root powder. The herb merits further research as it may be a source of potential anticancer and anti-rheumatic agent(s).*Picrorhiza kurroa* Alcoholic extract of the plant and kutkin possess hepatoprotective activity plant is a potent immune-stimulant of both cell medicated and humoral immunity and exhibits choleretic activity in dogs. *P.kurroa* is a also beneficial in the management of bronchial asthma. *Cyperus rotuntus* several ayurvedic preparations used in general debility, dyspepsia, fever, and urinary diseases. In the different formulations used by different herbal practitioners, these plants were the chief ingredients to treat arthritis and the related pyrexia. The herbalists used to prescribe their formulations to be orally taken in the form of tablets (or) applied topically and it was claimed by the people to be cured safely. The impressive demonstration of efficacy necessitated this preliminary investigation whose objective is to prepare formulation and verity the same for its antipyretic activity in animal models.

MATERIALS AND METHODS

Preparation of Poly Herbal Formulation

Ingredients of *Sweertia chirata, Solanum xanthocarpum, Tinospora cortifolia, Operculina turpethum, Cyperus rotuntus, picrorrhiza curroa, Melia azadirachta)* were collected from Chennai. The plants were identified and authenticated by taxonomists of Department of pharmacy vels university Chennai , the powdered materials were taken in the following proportion *Sweertia chirata-100g, Solanum xanthocarpum-100g, Tinospora cortifolia-100g, Operculina turpethium-100g, Cyperus rotuntus-100g Picrorrhiza curroa-100g Melia azadirachta-100g.*All the powdered materials were mixed thoroughly and were extracted through cold maceration in 70% ethanol extract by keeping it over night. The extracts were concentrated under reduced pressure and controlled temperature (40-50^{0}c) using a rotary vacuum evaporator (super fit, India). The extract obtained was dark brown semi solid It was preserved in refrigerator and used further for experimental studies by making a suspension in 2% aqueous Tween 80% solution in specific doses

Animals

Albino rats (wister stain) of either sex weighing 160-200g were used in the study. The animals were kept in polypropylene cages and maintained by providing balanced food and water libitum. Experiments were performed complied with the rulings of the committee for the purpose of control and supervision of experiments on animals New Delhi India and the study was permitted by the university Chennai India.

Antipyretic Evaluation

The antipyretic activity was evaluated using Brewer's yeast induced pyrexia in rats. Fever was induced by subcutaneous injecting 20ml/kg of 20 % aqueous suspension of Brewer's yeast in normal saline after measuring the rectal temperature using digital thermometer. Eighteen hours (0 h) after the yeast injection the animals were again placed in individual cages for recording the rectal temperature. The polyhedral formulation at doses of 150 and 300mg/kg was administered orally 18

h after the yeast injection to the two groups of rat. The animals of control group were administered orally the suspension of 2% aqueous solution of Tween 80 a volume of 5 ml/kg. The animals of fourth group received the standard prototype antipyretic agent paracetamol (150/mg/kg) orally. The rats were restrained for their rectal temperature to be recorded at the 0 h immediately before vehicle (or) paracetamol administration and again at hourly intervals for five years after yeast injection

1. Name of the Medicinal Plants and its collection

The following plant materials are used for the present investigation. The genus and family name of the plants are given below:

Name of the plant	Family	Part Used
Swertia chirata	Gentianaceae	Whole parts
Solanum xanthocarpum	Solanaceae	Whole parts
Tinospora cordifolia	Menispermaceae	Whole parts
Operculina turpethum	Convoluvlaceae	Root
Cyperus rotundus	Cyperaceae	Root
Picrorrhiza curroa	Scrophulariaceae	Root
Melia azadirachta	Meliaceae	Whole parts

2. Extraction and Phytochemical Test

10 gm of coarsely grinded each plant material is macerated with 70% V/V of ethanol for 7 days. The resultant extract was filtered through filter paper and evaporated to dryness. The percentage yield of the extract was found to be 28.57% w/w. The Qualitative Phytochemical tests are carried out as per standard protocol, the results of the qualitative phytochemcial tests was shown in Table 1.

Table 1: Qualitative phyto chemical tests for 70% of hydro alcoholic herbal formulation

S. No	Name of the Qualitative Test	Results
1.	Alkaloids	+++
2.	Flavonoids	++
3.	Terpenoids	++
4.	Steroids	++
5.	Glycosides	++
6.	Protein	++

RESULTS

Administration of brewer yeast to rats significantly increase the body temperature which is absorbed 1hrs to 5.30pm time interval oral administration Aspirin, significantly reduce the body temperature from 1hrs to till the end of the study periods. However dose dependent antipyretic response was noted in polyhedral formulation in 500mg/ml and 250mg/ml body weight after 2hrs brewer yeast challenges.

Pharmacological Studies - Anti-pyretic studies of herbal formulation in rats

Brewers induced Pyrexia in rats

Group- 1 control

Animals	Initial	0 - min	1.30pm	3.30pm	4.30pm	5.30pm
R1	96.7	102.9	103.1	103.2	103.2	103.3
R2	96.2	102.3	102.5	102.5	102.6	102.7
R3	98.9	103.2	103.4	103.6	103.8	103.8
R4	95.5	102.2	102.4	102.5	102.5	102.8
R5	96.2	103.4	103.6	103.8	103.9	103.9
R6	96.4	102.8	102.9	103.1	103.5	103.8
Total	**96.65**	**102.8**	**102.9833**	**103.1167**	**103.25**	**103.3833**
	1.068878	**0.43589**	**0.43748**	**0.494694**	**0.543906**	**0.487909**

Group – 2 Aspirin

Animals	Initial	0 - min	1.30pm	3.30pm	4.30pm	5.30pm
R1	95.1	102.1	101.6	101.2	99.5	98.1
R2	95.7	102.5	101.7	101.4	101.1	99.6
R3	96.3	102.9	101.1	99.2	98.6	97.8
R4	95.8	102.7	100.8	99.6	98.7	96.9
R5	96.1	103.2	100.4	99.5	98.4	96.8
R6	96.4	102.8	101.5	99.9	98.1	96.7
Total	**95.9**	**102.7**	**101.1833**	**100.1333**	**99.06667**	**97.65**
	0.43589	**0.341565**	**0.466964**	**0.851795**	**1.004435**	**1.017759**

Group – 3 Drugs induced 500mg/kg

Animals	Initial	0 - min	1.30pm	3.30pm	4.30pm	5.30pm
R1	96.8	103.6	103.4	102.2	99.2	97.5
R2	96.5	103.3	103.1	101.5	98.4	97.4
R3	95.7	102.8	102.4	99.6	97.5	96.1
R4	95.2	103.4	102.8	99.9	97.8	96.7

R5	96.1	102.6	102.2	98.5	97.2	96.9
R6	96.3	103.1	102.5	99.8	98.1	97.2
Total	**96.1**	**103.1333**	**102.7333**	**100.25**	**98.03333**	**96.96667**
	0.525991	**0.344803**	**0.414997**	**1.236595**	**0.649786**	**0.474927**

Group – 4 Herbal extract

Animals	Initial	0 - min	1.30pm	3.30pm	4.30pm	5.30pm
R1	95.7	103.8	102.9	101.6	99.2	98.5
R2	95.5	103.6	103.2	101.4	98.1	97.2
R3	96.4	103.2	102.8	101.9	97.5	96.5
R4	97.5	103.1	102.6	101.1	98.7	97.4
R5	96.1	103.5	102.8	101.3	98.5	97.3
R6	95.4	102.9	102.3	99.8	97.3	96.1
Total	**96.1**	**103.35**	**102.7667**	**101.1833**	**98.21667**	**97.16667**
	0.714143	**0.30957**	**0.274874**	**0.666875**	**0.664371**	**0.756454**

Two - Way RM ANOVA matching by cols

Source of Variation	% of total variation	P value
Interaction	14.12	< 0.0001
Time	66.05	<0.0001
Drugs	14.11	<0.0001
Subjects (matching)	3.0198	<0.0001

Source of Variation	% of total variation	signficant
Interaction	****	Yes
Time	****	Yes
Drugs	****	Yes
Subjects (matching)	****	yes

Source of Variation	Df	Sum-of -squares	Mean square	F
Interaction	15	164	11	35
Time	5	768	154	489
Drugs	3	164	55	31
Subjects (matching)	20	35	1.8	5.6
Residual	100	31	0.31	

Number of missing values

Bonferroni multiple comparisons **Number of comparisons: 18**

Control vs. Aspirin

Drug	Control	Asprin	Difference	95% cl of diff
Basal	97	96	-0.75	-2.1 to 0.56
0 hrs	103	103	-0.10	-1.4 to 1.2
1:30 hrs	103	101	-1.8	-3.1 to -0.49
3:30 hrs	103	100	-3.0	-4.3 to -1.7
4:30 hrs	103	99	-4.2	-5.5 to -2.9
5:30 hrs	103	98	-5.7	-7.0 to -4.4

Drug	Difference	T	P value	Summary
Basal	-0.75	1.7	p> 0.05	Ns
0 hrs	-0.10	0.23	p>0,05	Ns
1:30	-1.8	4.2	p< 0.001	***
3:30	-3.0	6.9	p<0.0001	****
4:30	-4.2	9.7	p<0.0001	****
5:30	-5.7	13	p<0.0001	****

Control vs. PHF 500

Drug	Control	PHF 250	Difference	95% cl. of diff
Basal	97	96	-0.55	-1.9 to 0.76
0 hrs	103	103	0.33	-0.98 to 1.6
1:3 hrs	103	103	-0.25	-1.6 to 1.1
3:30hrs	103	100	-2.9	-4.2 to -1.6
4:30 hrs	103	98	-5.2	-6.5 to -3.9
5:30 hrs	103	97	-6.4	-7.7 to -5.1

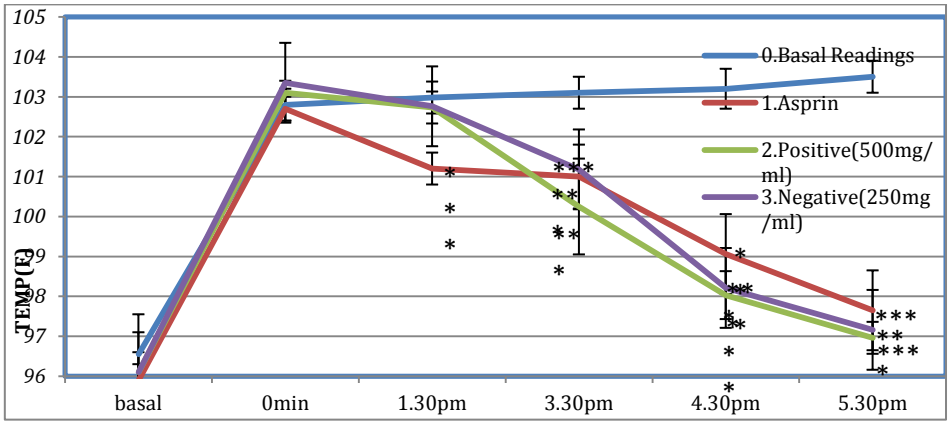
Drugs	Difference	T	P value	Summary
Basal	-0.55	1.3	p> 0.05	Ns
0 hrs	0.33	0.78	p>0.05	Ns
1:30 hrs	-0.25	0.58	p>0.05	Ns
3:30 hrs	-2.9	6.7	p<0.0001	****
4:30 hrs	-5.2	12	p<0.0001	****
5:30 hrs	-6.4	15	p<0.0001	****

Control vs. PHF- 250

Drug	Control	PHF-250	Diffference	95% cl difference
Basal	97	96	-0.55	-1.9 to 0.76
0 hrs	103	103	0.55	-0.76 to 1.9
1:30 hrs	103	103	-0.22	-1.5 to 1.1
3:30 hrs	103	101	-2.1	-3.4 to -0.79
4:30 hrs	103	98	-5.0	-6.3 to -3.7
5:30 hrs	103	97	-6.2	-7.5 to -4.9

Drug	Difference	T	P VALUE	Summary
Basal	-0.55	1.3	P > 0.05	Ns
O hrs	0.55	1.3	P> 0.05	Ns
1:30 hrs	-0.22	0.50	P> 0.05	Ns
3:30 hrs	-2.1	4.9	P<0.0001	****
4:30 hrs	-5.0	12	P< 0.0001	****
5:30 hrs	-6.2	14	P<0.0001	****

Fir 1: Error Bars with Standard Deviation



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