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COMPARATIVE IN-VIVO INVESTIGATION OF ANTIPYRETIC ACTIVITY OF THE METHNAOLIC EXTRACT OF TWO PLANTS OF FAMILY FABACAEAE

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ABSTRACT

To evaluate the in vivo antipyretic activity of a methanolic extract of *Vigna unguiculata* Linn. and *Phaseolus vulgaris*. The In-vivo antipyretic potentials became determined via brewer's yeast and DNP induced pyrexia techniques. Antipyretic results of methanolic extract of *V. unguiculata* and *P. vulgaris* has been investigated at doses 200mg/kg b. w. and 400mg/kg b. w. for DNP precipitated pyrexia methods, Extracts of both of *V. ungiculata* and *P. vulgaris* (200 and 400 mg/kg) produced dose-structured and widespread ($p<0.01$, 0.001) inhibition of temperature elevation with height effect produced at the 1st hour of administration of plant extract. At this time interval, the improved temperature did no longer decrease for the standard drug, aspirin (100 mg kg−1). Significant inhibition of temperature elevation by way of the extract became determined from 1-hour of post-treatment. In case of brewer's yeast caused pyrexia strategies, both of the methanolic crude extracts of *V. unguiculata* and *P. vulgaris* confirmed antipyretic potentials, wherein *P. vulgaris* showed highest antipyretic pastime between these plant samples, while the *V. unguiculata* Confirmed lowest antipyretic activity. This experiment gives evidence for the antipyretic hobby of methanolic extract of *V. unguiculata* and *P. vulgaris* which, which can partly make a contribution to its ethnic clinical use.

KEYWORDS : *V. unguiculata, P. vulgaris*, Pyrexia, Brewer's yeast, DNP.

1. Introduction

Medicinal flora is assuming greater importance inside the primary fitness care of people and groups in plenty of developing worldwide places. Indian medicinal plant life and their derivatives have been a useful supply of recovery entrepreneurs to address diverse issues. Herbal drug remedies are frequently perceived as secure due to the fact they're "herbal". In modern years herbal remedy is the principal trouble in all traditional medicine systems, and a common detail in Siddha, Ayurvedic, Homeopathic, Naturopathic, Traditional Chinese treatment, and Native American remedy. Considerable efforts were directed closer to the development of herbal products from various plant property.[1-3] Today a superb extensive range of medicine is advanced from the plant which is probably energetic in competition to some of the ailments. The majority of those contain the isolation of the active issue (chemical compound) decided in a specific medicinal plant and its next change. In the advanced worldwide locations, 25 percent of the clinical pills are based totally on flora and their derivatives and using medicinal flowers is appreciably identified the numerous indigenous human beings in rural areas of many developing international locations.[4] Pyrexia or fever is described as an elevation of body temperature. It is a response because of tissue harm, infection, malignancy or graft rejection. Cytokines, interleukin, interferon and Tumor Necrosis Factor α (TNF-α) are customary in huge amount under this example, which boom PGE2 which in flip triggers hypothalamus to elevate body temperature.[5] Fever is related to signs of infection behavior which consist of lethargy, despair, anorexia, sleepiness, & lack of capability to pay interest. This growth in set component triggers extended muscle tone & shivering. However antipyretic medication may be effective at decreasing the temperature which can also consist of the affected human beings consolation.[6] According to Ayurveda, pyrexia originates from an combination of indigestion, seasonal versions and huge changes in daily regular.[6] Due to terrible hygiene practices and malnutrition, children in growing worldwide places often suffer from numerous types of infections which gift as fevers. These fevers are regularly observed by way of aches and pains which all cause morbidity and mortality.[7] Antipyretics are drugs that may lessen elevated body temperature. Regulation of body temperature requires a delicate balance between manufacturing and loss of warmth, and the hypothalamus which adjust the set factor of frame temperature. Drugs like paracetamol do now not have an effect on body temperature while elevated by means of factors inclusive of workout or boom in ambient temperature.[8] Plants have paid a top notch role in health care because of the historic instances. Traditional plant based drugs still exert a superb deal of significance to human beings living in developing countries and additionally lead to discovery of new drug candidates.[9]

V .unguiculata which is maximum typically known as "cowpea". It is a suitable for eating legume and belongs to own family Fabaceae with excessive protein volume. It is a pairing jungly glabrous, anniversary plant. The fruit legumes augment up to ninety cm in length and the pods are barely chapfallen between the seeds. There is 10 – 20 seeds observed in every pod. The seeds are varies in size, color and form. The seeds are sweet in nature and they have, laxative, astringent anthelmintic, antibacterial, diuretic and galacto-gogue properties. The seeds also assist in releasing the situations like constipation, jaundice, anorexia, and widespread debility.[10,11]

Phaseolus vulgaris (Linn) is a sub-erect or twining annual herb, a local of central and South America and is now grown considerably for the duration of the warm regions of the arena.[12] Vernacular names of the plant *P. vulgaris* are in Kannada- Tingalavari, Hindi-Rajma, Gujarati-Fansi, Kashmiri-Fraa'sh been, Marathi-Pharas bee and Punjabi-Fras bean. Literature survey discovered that *P. vulgaris* seeds show off extraordinary organic sports like enhancement of the bifidogenic impact,[13] antioxidant,[14] anticarcinogenic,[15] estrogenic, [16] antidepressant,[17] and antibacterial and antitubercular,[18] and so forth. *P. vulgaris* seeds have a critical vicinity inside the folk's medicine of the world and within the traditions of many cultures due to their pharmacotherapeutic results.[19] However, *P. vulgaris and V. unguiculata* have no longer been investigated for antipyretic activity. Hence, this examine become done to assess the potent bioactive ingredients for Antipyretic activity in *P. vulgaris and V. unguiculata* seeds.

2. Materials and Methods

2.1. Experimental animal

The test will become finished by way of the usage of Wister rats (100-150 g). All the animals were obtained from the Animal House of the Department of Pharmacy, Jahangirnagar University. All animals had been maintained below fashionable environmental situations

(relative humidity 55-65%, room temperature 23.0 ± 2.0 c and 12 h light-dark cycle) and had free get admission to standard rodent weight-reduction plan and water advert libitum. The test became completed in the Physiology Laboratory of Department of Pharmacy at Noakhali Science and Technology University.[20]

2.2. Experimental design

Rats had been randomly divided into six groups of 4 rats in every organization. Each organization received a specific remedy. Prior to any treatment, every rat became weighted nicely and the doses of the extract and control (distilled water) were adjusted accordingly. As it became tough to observe the biological reaction of 4 rats at a time receiving the equal remedy, it becomes important to identify man or woman animal of a collection for the duration of the treatment. Therefore, each animal's tail became marked by way of a permanent marker to distinguish from others and marked as M1= Rat 1(having 1 dot on its tail), M2= Rat 2 (having 2 dots on its tail), M3= Rat 3 (having three dots on its tail) and so on.

2.3. Principle of Brewer's yeast induced pyrexia model

Antipyretic activity on Wister rats became studied with fever brought about via 20% Brewer's yeast.[21] Wister rats (one hundred fifty-200 g) had fasted for twenty-four hours. After measuring the rectal temperature of the rats by way of introducing 1.5 cm of a digital thermometer in the rectum, pyrexia changed into induced by injecting intraperitoneally, 20% suspension of dried yeast in distilled water, at a dose of 20 ml/kg of frame weight. After 18 hours of yeast injection, rats which confirmed a rise in temperature of at least 1°C has been taken for the have a look at. Rectal temperature becomes recorded every hour for 4 hours after management of drugs.

2.4. Preparation of test materials for brewer's yeast induced pyrexia methods

In order to manage the extract at doses of 200 and 400 mg/kg body weight of rat, the precisely weighed extracts have been measured respectively and triturated in a unidirectional way via adding a small amount of distilled water. After right mixing of extract, distilled water was slowly introduced to make the final quantity of the suspension up to 10.0 ml. To stabilize the suspension, it was stirred nicely by means of vortex mixture. The yeast solution prepared via dissolving 20 mg Brewer's yeast in 100 ml distilled water to get 20% w/v answer. For the preparation of fashionable (Paracetamol) on the dose of 25-mg/kg body weight, 500 mg pill turned into taken and triturated in a unidirectional way by including of small quantity of distilled water. After proper blending of extract, distilled water became slowly brought to make the final extent of the suspension as much as 200.0 ml. To stabilize the suspension, it becomes stirred nicely by means of vortex aggregate. The control group became treated with simple distilled water.

2.5. Principle of DNP induced pyrexia model

Antipyretic assay on Wister rats become studied with fever induced with the aid of 10 mg/kg DNP.[22] Wister rats (a hundred and fifty-two hundred g) have been fasted for 24 hours, and handiest water becomes given. After measuring the rectal temperature of the rats by way of introducing 1.5 cm of a digital thermometer in the rectum, pyrexia was brought on through injecting intraperitoneally, 20% suspension of DNP powder in distilled water, at a dose of 20 mg/kg of body weight. After 12 hours of DNP injection, rats which showed an upward push in temperature of at the least 1°C have been taken for the study. Rectal temperature become recorded every hour for 4 hours after administration of medicine.

2.6. Preparation of test materials for DNP induced pyrexia methods

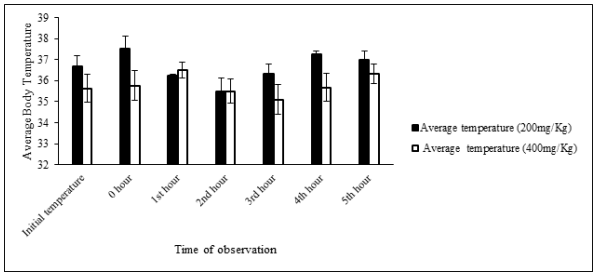
In order to administer the extract at doses of 200 and four hundred mg/kg body weight of rat, the exactly weighed extracts have been measured respectively and triturated in a unidirectional manner by means of including of small amount of distilled water. After proper blending of extract, distilled water become slowly added to make the final volume of the suspension up to 10.0 ml. To stabilize the suspension, it changed into stirred nicely with the aid of vortex aggregate. The DNP answer changed into organized by way of dissolving 100 mg DNP powder in 100 ml distilled water. For the training of fashionable (aspirin) at the dose of a hundred-mg/kg frame weight, 500 mg tablet became taken and triturated in a unidirectional manner by including of small quantity of distilled water. After right mixing of extract, distilled water was slowly introduced to make the very last extent of the suspension up to 50.0 ml. To stabilize the suspension, it becomes stirred nicely by using vortex aggregate.

3. Results

Both of the methanolic crude extracts of *V. unguiculata* Linn. and *P. vulgaris* confirmed antipyretic potential. *P. vulgaris* confirmed maximum antipyretic potentiality between plant samples, at the same time as the *V. unguiculata* showed lowest antipyretic activity(Figure-1). Effect of methanolic complete plant extract of *V. unguiculata* and *P. vulgaris* on rectal temperature in rats is presented in figure 1 and figure 2. The subcutaneous injection of yeast suspension markedly accelerated the rectal temperature after 18h of management. Treatment with P. vulgaris extract at a dose of 200, 400 mg/kg reduced the rectal temperature of the rats in the dose based way, however, *V. unguiculata* do not show as in dose based manner. It became observed that the extract at a dose of 200 mg/kg brought an about huge lowering of body temperature at 2 hours following its administration (36.23±0.09) and (36.47±0.37) for *V. unguiculata* and *P. vulgaris* respectively. This effect turned into maximal at a dose of 200-mg/ kg and it precipitated substantial lowering of body temperature up to four hours after its administration (36.33±0.47) and (34.26± 0.09). During another bioassay, the antipyretic impact began as early as 1h and the impact changed into maintained for 4h, after its management. Both the same old drug paracetamol 25 mg/kg and tested drug *V. unguiculata* and *P. vulgaris* extract have been substantially reduced the yeast-accelerated rectal temperature, at the second, third and 4th hour as compared to control institution (Figure-3).

Intraperitoneal injection of 2, four-DNP brought about a boom in body temperature of control rats from 35.73 °C to 36.65 °C 1 h after administration. Extracts of each of *V. unugiculata* and *P. vulgaris* (200 and 400 mg kg−1) produced dose-established and widespread ($p<0.01$, 0.001) inhibition of temperature elevation with the top effect produced at 1st h post treatment (Figure-4 and 5). At this time interval, the expanded temperature did now not reduced for the standard drug, aspirin (100 mg kg−1). Significant inhibition of temperature elevation by using the extract turned into determined from 1 h post-treatment.

Figure-1: The data representing effect of methanolic extract of *V. unguiculata* Linn. on elevation of body temperature after administration of Yeast



Number of animals in each group= 4, data's are represented by Mean±SEM, SEM = Standard error of mean

4. Discussion

At present popularity of herbal medicine derive from plant is increasing day by day because of their capability of relieving diseases and limited adverse effects.[23] The use of many established drugs are limited now a days because of their developing resistance. On the other hand, appearance of new diseases makes human life

vulnerable.[24] So, we need to overcome those hazards. Herbal medicine contains various chemical constituents are being used to treat several diseases though we have very little knowledge about their mode of action.[25] Again in many cases use of antipyretic drug against fever are unsuccessful because of their undesirable side effects. That's why development of new drug without those adverse effects is our prime concern.[26] New drug development always depends on the conventional perception about medicinal plant.[27]

Elevation of body temperature is often refers to fever which is usually triggered by various infectious and inflammatory disorders.[28] Activated peripheral mononuclear phagocytes and other immune cells release various important mediators like cytokines, namely interleukin-1, interleukin-6, tumor necrosis factor, and others which are responsible for the body temperature elevation.[29, 30] Cytokines mediators transfer to the brain through blood with the help of specific carrier.[31] Than it binds to the specific receptor on brain endothelial cells[32] or perivascular cells.[33] As a result various pyrogenic mediators are secreted into the brain abluminal tissue. Antipyretic effects are attained by the suppression of these mediators. This type of mechanism is referred as humoral hypothesis of fever.[28] But the fundamental mediators responsible for fever are prostaglandin E2 (PGE2), which is secreted from cyclooxygenase (COX)-2, within the brain[34] that is acting on thermosensitive or thermointegrative hypothalamic neurons. Antipyretic activity of drugs or compound indicates the obstruction of prostaglandin biosynthesis.[35] Increased concentration of prostaglandin E2 (PGE2) within the brain responsible for pyrexia. High level of prostaglandin modifies the thermoregulation system in the hypothalamus.[35] So, antipyretic effect could be achieved by the blockage of prostaglandin synthesis which suppresses the rise of interleukin- 1α production following to interferon production and it can be obtained by the repression of the cyclooxygenase enzyme activity.[35] Almost all antipyretic drugs acts by the depletion of PGE2 level inside the hypothalamic region as well as restrain enzymatic action of cyclooxygenase.[36] Many studies showed that, flavonoids and saponin working together as an antipyretic agent by inhibiting TNF-α [37] and following suppression of arachidonic acid peroxidation, which lowers the prostaglandin levels results in depletion of fever and pain.[38] Similar result was also found in our present study.

Our study showed that, persuasion of hyperpyrexia in rat model by Brewer's yeast was occupied for the examination of extract antipyretic activity. The extract may achieve antipyresis through its proceeding on COX-3 resulting the diminishing of PGE2 or activating the release of body's own antipyretic substances like vasopressin and arginine.[39] The two species used in this examine, *V. unguiculata* and *P. vulgaris* whole plant extract own alkaloids, flavonoids, tannins, terpenes, glycosides, phytosterol, protein and starch. The preliminary phytochemical screening of the crude methanolic extracts of the 2 selected plants confirmed the presence of steroids, tannins and flavonoids. The antipyretic interest is because of the presence of steroids.[40] The methanolic extracts of *V. unguiculata* and *P. vulgaris* showed enormous antipyretic activity in rats is because of the presence of the phytoconstituents flavonoids, steroids and saponins.[41] Presences of flavonoids in those two species and flavonoids are recognized to inhibit prostaglandin synthetase.[42] Therefore it appears that antipyretic action of those species can be related to the inhibition of prostaglandin synthesis in hypothalamus.[43]

In our observation *V. unguiculata* and *P. vulgaris* each species confirmed anti-pyretic activity. But from P. vulgaris we'd discovered highest spectrum for anti-pyretic activity than *V. unguiculata*. So we suppose more assay to be wanted about P. vulgaris species and advance phytochemical screening additionally gives us better information approximately its antipyretic potentiality and at the equal time its way of motion

5. Conclusion

In end, this study presents shreds of evidence for the antipyretic interest of *V. unguiculata* and *P. vulgaris* that could partly make contributions to its ethno medical use. The consequences of the present have a look at proposing that the methanolic extract of *V. unguiculata* and *P. vulgaris* in doses of 200 and 400 mg/kg, notably lessen the temperature of pyretic rats as discovered from the observation that the common percentage of antipyretic pastime multiplied with the concentration of the extracts (400mg/Kg) as compared with the control. It is also presumed that the presence of flavonoids may be contributing to antipyretic sports of methanolic extract of *V. unguiculata* and *P. vulgaris*, as in the case of some of them hooked up antipyretics. However, similarly, the investigation is needed to isolate the active constituents responsible for those sports and to explain the exact mechanisms of movement.

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Competing interest

The authors declare that they have no competing interests.

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