Anti-pyretic effect of methanolic Physalis micrantha Link. extract

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Abstract
The present study aimed to investigate the anti-pyretic effect of Physalis micrantha methanol extract (MEPM) in Mus musculus. Findings suggest that MEPM at 250 and 500 mg/kg (p.o.) showed a significant anti-pyretic effect on the test system in comparison to the control (vehicle) groups. Physalis micrantha might be a good source of anti-pyretic agents. Further studies are needed to isolate and quantify chemical constituents present in this plant and to evaluate possible mechanisms of action for the anti-pyretic activity in suitable test systems.

Keywords: Physalis micrantha, Mus musculus, anti-pyretic effect

Introduction
Although antipyretic potential seems to be a feature of medications or chemicals that suppress prostaglandin manufacturing, it is a helpful tool for determining the overall antipyretic capabilities of biomass and synthesized pharmaceuticals (Habib et al., 2013)[7]. For well over a thousand years, antipyretics have been used to suppress feverish core temperatures (Mackowiak et al., 1998)[12]. Three vital hypotheses are established during administering antipyretic medication (Walsh et al., 2018)[15]. It may be that fever is toxic, at least partially, and indeed, the second would be that controlling fever would minimize, if not abolish, the unquestionable consequences of fever (Plaisance et al., 2000)[14]. Infants, primarily between the ages of three and five, are only one subset of people (Camfield et al., 2007)[15]. All other regions had rates as high as 14% (Hauser et al., 1994)[10]. Due to the obvious increased respiration requirements placed on either by higher temperatures, individuals having existing coronary or respiratory illnesses may be more sensitive to the negative consequences of infection (Mackowiak et al., 1997)[11]. The discharge of pyrogenic cytokines by provocative cells to a certain extracellular biological agent, initialization of cyclooxygenase (COX)-2 stimulation of both the eicosanoid sequence and augmented biosynthetic pathway of prostaglandin E2 (PGE2), besides pituitary gland vascular endothelium, are all essential components of the disease metabolic route (Hirtz et al., 1989; Kluger et al., 1996)[8, 10]. PGE2 raises the hypothalamus’s thermal breakpoint via acting on temperature regulation synapses in the preoptic region of the frontal hypothalamus, inducing periphery and metabolic processes to elevate body temperature (Milton et al., 1971)[13]. Antipyretics might hypothetically disrupt the feverish sensitivity at whatever point somewhere along the route (de Sousa António et al., 2009)[41]. By blocking COX, acetaminophen, aspirin, or the other non-steroidal anti-inflammatory drugs (NSAIDs) seem to limit the enzyme that converts to PGE2 (Fiebich et al., 2000)[35]. This study evaluates the anti-pyretic effect of methanolic Physalis micrantha extract in Swiss mice.

Materials and Methods
Plant collection and identification
For this study, P. micrantha was collected from the hills of the Forest Research Institute; Chittagong and Rangunia; Chittagong, Bangladesh in October 2014 at day time and was identified by the Forest Research Institute; Chittagong, Bangladesh.
Extraction
The collected plant parts were separated from undesirable materials or plants or plant parts, sun dried at 35 to 50 °C, and ground into a coarse powder with the help of a suitable grinder. The powdered material (150 gm powder) was subjected to hot extraction with 97.7% methanol (800 mL) using a Soxhlet Apparatus (Quickfit, England). The obtained extract was collected, filtered, and made to evaporate the solvent below 50 °C.

Reagents and chemicals
Brewer’s yeast was purchased from the local market in Chattagram, Bangladesh. GlaxoSmithKline Bangladesh Ltd. kindly provided paracetamol. Other required chemicals and reagents such as Tween-80 were purchased from Merck India Ltd.

Experimental animals
Young Swiss mice of either sex, with an average body weight of 18–21 gm, were purchased from the International Center for Diarrhoeal Diseases Research, Dhaka, Bangladesh (ICDDR, B), were used for this experiment. The animals were housed in a room with a temperature of 25 2 °C, a humidity of 50 5%, and a 12 hour dark/light cycle. Diet and water ad libitum were provided to the animals. They were subjected to this study after seven days (an acclimatization period). The animals were randomly grouped into the test and control groups, and the food was withdrawn 12 hours before the experimental hours.

Anti-pyretic activity study (in vivo)
Preparation of test samples
20% Brewer’s yeast suspension was prepared with distilled water and stirred to the point to get a homogeneous suspension. Paracetamol solution was prepared at a dose of 150 mg/kg (p.o.) with distilled water, while MEPM at 250 and 500 mg/kg (p.o.) were prepared with 0.05% Tween-80 dissolved in 0.9% NaCl solution. 0.05% Tween-80 dissolved in 0.9% NaCl solution served as vehicle group. They were subjected to this study after seven days (an acclimatization period). The animals were randomly grouped into the test and control groups, and the food was withdrawn 12 hours before the experimental hours.

Study design
This study was performed with a slight modification of the method described by Adams et al. (1968) [1]. Briefly, mice (fasted overnight with water) were subcutaneously (s.c.) treated with a 20% (w/v) Brewer’s yeast suspension at a 10 mL/kg dose into the dorsum region of each animal. Seventeen hours after the injection, the rectal temperature of each mouse was measured using a digital thermometer (SK-1250MC, Sato Keiryoki Mfg. Co., Ltd., Japan). Only mice that showed an increase in temperature of at least 0.7 °C were used for this study. Mice were randomly divided into three groups: Gr-I (vehicle), Gr-II (standard, paracetamol) and Gr-III (test sample, MEPM two doses). After administration of the test or controls (described before), the rectal temperature of each mouse was measured at 0th, 1st, 2nd and 3rd hr.

Table 1: Rectal temperature (°F) of mice recorded in test and control groups

<table>
<thead>
<tr>
<th>Treatment groups (p.o.)</th>
<th>Basement temp. (°F)</th>
<th>0ºHr</th>
<th>1ºHr after 18 hrs of yeast injection</th>
<th>2ºHr</th>
<th>3ºHr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>94.30 ± 0.18</td>
<td>98.40 ± 0.02</td>
<td>99.00 ± 0.16</td>
<td>100.40 ± 0.08</td>
</tr>
<tr>
<td>Vehicle (10 L/kg)</td>
<td></td>
<td>94.19 ± 1.11</td>
<td>99.00 ± 0.04</td>
<td>96.60 ± 0.97*</td>
<td>95.30 ± 1.06*</td>
</tr>
<tr>
<td>PC (150 mg/kg)</td>
<td></td>
<td>94.40 ± 0.10</td>
<td>98.30 ± 0.11</td>
<td>98.03 ± 0.11</td>
<td>97.08 ± 0.14*</td>
</tr>
<tr>
<td>MEPM (250 mg/kg)</td>
<td></td>
<td>94.20 ± 2.08</td>
<td>99.00 ± 0.08</td>
<td>97.33 ± 0.21*</td>
<td>96.77 ± 0.54*</td>
</tr>
<tr>
<td>MEPM (500 mg/kg)</td>
<td></td>
<td>94.20 ± 2.08</td>
<td>99.00 ± 0.08</td>
<td>97.33 ± 0.21*</td>
<td>96.77 ± 0.54*</td>
</tr>
</tbody>
</table>

Values are mean ± SD (n = 5); One-way ANOVA followed by post hoc test; *p<0.05 when compared to the vehicle group (0.05% Tween-80 dissolved in 0.9% NaCl solution); PC: Paracetamol; MEPM: Methanol extract of Physalis micrantha

Conclusion
MEPM showed a significant and dose-dependent anti-pyretic effect on Swiss albino mice. P. micrantha might be one of the good sources of anti-pyretic agents.

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Conflict of interest: None declared.

References