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Antipyretic Activity of The Aqueous Extract of Cumin (*Cuminum cyminum* L.) with Yeast Induced Pyrexia in Female Rats.

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Abstract*— Cumin (Cuminum cyminum L.) is one of the important aromatic plants that is used as an antipyretic in folk medicine. This study aims to evaluate the antipyretic activity of the aqueous extract C. cyminum seeds using the brewer's yeast induced pyrexia method in female rats. Twenty-five adult female rats were divided into five groups (n=5). The first was normal control that only orally received 1 ml of distilled water. Pyrexia was induced in the remaining groups by injection of 30% yeast suspension (10 mg/kg). Two groups of the pyretic animals were set as negative control and positive control groups that were orally treated with 1 ml of distilled water and intraperitoneal injected with Aspirin 100 mg/kg, respectively. The fourth and fifth groups were orally received 200 and 400 mg/kg of the aqueous extract of C. cyminum seeds, respectively. Rectal temperature was significantly ($P \leq 0.05$) decreased in the animal groups treated with Aspirin and C. cyminum extract at both doses when it was measured after 1 h. of drug administration.

***Keywords*— Cumin, *Cuminum cyminum*, antipyretic**

I. INTRODUCTION

The term fever or pyrexia means that the temperature of the body is higher than the normal value due to the hypothalamic rise in set-point temperature (Anochie, 2013).

According to body temperature, animal species are classified into homoeothermic and poikilothermic animals. Homoeothermic animals include mammals and birds that can regulate their body temperature relatively stable despite the surrounding temperature fluctuations. The heat exchange between the homoeothermic animals and their surroundings is regulated by the thermoregulatory center (Schmidt-Nielsen, 1997; Rastogi, 2001).

Fever originates from different factors, including microbial infections such as enteric fever, seasonal variations, and physiological stress, such as exercise and increasing thyroid secretion (Meller et al., 2007; Vasundra and Divya, 2013).

Herbal medicine takes on considerable significance in primary health care. More than 75% of the human population depends on medicinal plant extracts, and more than 30 % of known plant species is reserved for therapeutic use. WHO supports the use of herbal treatments that have been proven to be effective in primary health care (Ayon *et al*., 2014).

Cumin (*Cuminum cyminum* L.) is one of the important aromatic plants from the Apiaceae family that is widely used as a food additive for fragrance or medicinal preparations. Cumin seeds are used in herbal medicine for treating toothache, dyspepsia, diarrhea, and jaundice (Bhat *et al*., 2014).

The finding of safe, potent antipyretics from herbal origin received considerable attention recently. Available antipyretic drugs such as nimesulide and paracetamol have a toxic side effect to different organs. In folk medicine, *C. cyminum* seeds are used as an antipyretic cure (Begum *et al*., 2011)

The antipyretic activity of this plant seeds is not well investigated. The present study aims to evaluate the antipyretic effect of aqueous extract of *C. cyminum* seeds

II. MATERIALS AND METHODS

A. Plant collection

Dried *C. cyminum* seeds were collected from the local markets in Nasiriyah City, Thi-Qar Province, south of Iraq. The seeds were authenticated as C. cyminum according to (Heywood et al., 2007) in University of Basrah/ College of Science. The seeds were ground for further extraction.

B. Plant extraction

Twenty-five grams of *C. cyminum* seed powder was extracted using a stirrer hot plate with 200 ml of distilled water for 8 hours. The extract was left to stand and was

filtered into Whatman No.1 filter papers. The extract was concentrated by rotary evaporator and sterilized through a Millipore filter (0.22 µm) and left to dry in a sterilized space at room temperature; then, it was stored in dry clean vials at 4˚C (Harborne, 1984).

C. Experimental animals

Twenty-five adult female rats were purchased from University Of Al-Qadisiyah/ College of Veterinary Medicine. The rats were maintained at 20°C ± 2°C with a day/night cycle of 12 hours and access to water and water *ad libitum*.

D. Antipyretic activity

C. cyminum seed extract was evaluated for antipyretic effect by yeast-induced pyrexia test according to (Vasundra and Divya, 2013) with some modifications. Animals were randomly divided into five groups (n=5) and treated as follows:

Group (1): Orally received 1 ml of distilled water (normal control).

Group (2): subcutaneously injected with 30% (10 ml/kg) of brewer's yeast suspension and orally administrated 1 ml of distilled water (negative control).

Group (3): served as positive control that was subcutaneously injected with 30% (10 ml/kg) of brewer's yeast suspension and intraperitoneal injected with 100 mg/kg of acetylsalicylic acid (Aspirin).

Group (4): subcutaneously injected with 30% (10 ml/kg) of brewer's yeast suspension and orally treated with 200 mg/kg of *C. cyminum* seed extract dissolved in 1 ml of distilled water (Experimental group A).

Group (5): subcutaneously injected with 30% (10 ml/kg) of brewer's yeast suspension and orally treated with 400 mg/kg of *C. cyminum* seed extract dissolved in 1 ml of distilled water (Experimental group B).

Injection of 30% of brewer's yeast suspension (10 ml/kg) was used for inducing fever. The vehicle, reference drug, and plant extract were administrated after 6 hours of yeast injection. The animals' rectal temperature was measured by the use of a well-lubricated digital thermometer that was inserted into the rectum at the depth 2 cm at 0, 1, 2, and 3 hours after extract and standard drug administration.

E. Statistical analysis

Results were analyzed by SPSS 26 software using one way ANOVA test and were expressed as Mean ± SEM. Data was further subjected to LSD test. Differences between groups were considered significant at a level of $P \leq 0.05$.

groups	Time			
	0 h.	**1 h.**	**2 h.**	**3 h.**
1	37.46±0.09[b]	37.56±0.05[b]	37.52±0.08[b]	37.46±0.06 [b]
2	40.4±0.5[a]	41±0.44[a]	39.74±0.18[a]	39.14±0.12[a]
3	40.6±0.6 [a]	37.48±0.05 [b]	37.5±0.05 [b]	37.4±0.5 [b]
4	40.5±0.3 [a]	38.1±0.16b	37.76±0.58[b]	37.58±0.1 [b]
5	40.8±0.37 [a]	37.76±0.96 [b]	37.62±0.08[b]	37.56±0.12 [b]
LSD	**1.18**	**0.63**	**0.32**	**0.27**

III. Results and Discussion

Antipyretic effects of *C. cyminum* seed extract on rectal temperature are presented in (Table:1). Yeast injection markedly increased the rectal temperature. After 1 h. of administration, both of *C. cyminum* seed extract with the two doses (200 and 400 mg/kg) and the reference drug appeared a significant ($P \leq 0.05$) antipyretic activity. This significant reduction continued over a period from 1 h. to 3.

TABLE I. : ANTIPYRETIC ACTIVITY OF THE AQUEOUS EXTRACT OF C. CYMINUM SEEDS

Values are means ±S.E.M. Different letters refer to the significant difference at $P \leq 0.05$)

The increase of body temperature happens due to Prostaglandin E2 (PGE2) accumulates in the hypothalamus. The firing rate of hypothalamic neurons is the controller of thermoregulation, and it is altered by increased PGE2 synthesis. Many investigations had shown that inhibiting of cyclooxygenase and consequently decreasing of PGE2 levels in the hypothalamic region are the main action mechanisms of the most antipyretic drugs. However, it is difficult to rule out other mechanisms in pyrexia regulation (Saper *et al*., 2012; Anochie, 2013).

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