



Research Article

PHARMACOLOGICAL EFFECT OF CURCUMA ZEDOARIA RHIZOMES ON MILK INDUCED EOSINOPHILIA IN THE MANAGEMENT OF ASTHMA

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ABSTRACT

Aim of study: *Curcuma zedoaria* (Family: Zingiberaceae) is being used in traditional medicine for the treatment of severe bronchitis and asthma. So the aim of study was to evaluate antiasthmatic activity of extracts of *curcuma zedoaria* rhizomes to validate its traditional & Ethnopharmacological use.

Materials and methods: In the present study petroleum ether, ethanol and water extract of *Curcuma zedoaria* rhizomes at the doses of 25-100 mg/kg i. p. was evaluated for antiasthmatic activity using milk induced eosinophilia in mice.

Results: The results of present investigation showed that the ethanol extract of *Curcuma zedoaria* rhizomes at (25-100 mg/kg, i.p.) significantly decreases milk induced eosinophilia in mice in a dose dependent manner when compared to petroleum ether, water extract and control group.

Conclusion: It can be concluded that the ethanol extract of *Curcuma zedoaria* (100 mg/kg) may be useful in management & prevention of asthma.

KEYWORDS: *Curcuma zedoaria*, asthma, eosinophilia

INTRODUCTION

Asthma is a chronic inflammatory disorder of airway. Asthma affects about 300 million people worldwide and it has been estimated that a further 100 million will be affected by 2025. Asthma is common global health problem among individual of all ages are offered by chronic airway disorder. It defines as a chronic reactive airway disorder that produces episodic reversible airway obstruction via bronchospasm, increased mucous secretions and mucosal

edema. Asthma is a chronic inflammatory disorder of the airways [1].

Curcuma zedoaria Roxb (Figure 1) is a member of the family Zingiberaceae and popularly known as haldi. In India it is found in West Bengal, Madhya Pradesh, Orissa, Chhattisgarh, and Uttar Pradesh states. It nourishes well in moist deciduous forest areas. Rhizomes of the plant are used for sprains and bruises and also employed in the preparation of cosmetics. The effective use of *Curcuma*

longa Linn. well known since a long time; it is laxative, anthelmintic, and vulnerary.

Figure 1: *Curcuma zedoaria* plant



Besides this it is used in blood disorders, leukoderma, scabies, small-pox, and sprains. *Curcuma amada* Roxb. is useful in bronchitis, asthma, sprains, skin diseases, and in amputation caused due to injuries. The genus *Curcuma* is a well-known spice of India. It is also called Haldi and more than 200 species and subspecies of it is found all across the world. Fresh rhizomes are aromatic with intense camphoraceous odour and are applied externally to sprain and bruises. The rhizomes of Turmeric have a high economic importance owing to its putative medicinal properties [2].

Rhizome large, 5-6 × 9-10 cm, blue in the centre, verging towards grey, the blue colour is highly variable, depending upon the nature of the soil and age of the rhizome, strongly aromatic; sessile tubers branched, condensed; roots fleshy; root tubers many, ovate oblong, pale, watery pearl colour. Plants large, 70-100 cm tall, pseudo stem 30-35 cm tall, sheaths green. Leaves distichous, 79-100 cm; petiole as long as lamina; lamina 30-40 × 10-12 cm, oblong lanceolate, tip acute, base acuminate, glabrous, purple or reddish brown patch along the sides on the distal half of the mid rib on upper side only, fading at maturity, groove of the midrib green. Inflorescence lateral, 25-30 cm long, peduncle 12-18 cm; spike 12-15 × 5 cm; coma bracts large, pink to violet, lower ones streaked green. Fertile bracts 18-20, 4.5-5 × 4.4-5 cm, lower half used, tip rounded, green with pink tip, each bract subtends a cincinnus of 8-10 flowers [3].

MATERIAL & METHOD

Plant material

Rhizomes of *Curcuma zedoaria* were collected in Feb 2012, from Botanical Garden (Zinger Villa) Calicut University, Calicut (Kerala, India), and the plant was authenticated by Professor Dr. M. Sabu, Head, Department of Botany, Calicut University, Calicut (Kerala, India). A voucher specimen (PAR 14) was deposited in the herbarium for further use.

Extraction

Dried and coarsely powder of *Curcuma zedoaria* rhizomes (100 g) was defatted with petroleum ether and the marc remaining was extracted successively by 95% ethanol in Soxhlet extractor. Solvent was evaporated in rotary evaporator under reduced pressure to produce CCEE at 10.26% w/w.

Animals

Swiss albino mice of either sex weighing (25-30 g) were housed under standard laboratory conditions. The animals had free access to food and water. The Animal Ethical Committee of the Institute approved all the protocols of the study.

Milk induced Eosinophilia

Mice were divided into five groups, five animals in each group. Animals belonging to Group-I serve as control and treated with vehicle 1ml /kg, i.p. and boiled and cooled milk in a dose of 4 ml /kg, s.c. Animals belonging to Group II received only vehicle (5 % PEG-400, 1ml / kg, i.p.). Animals belonging to Group III, IV and V were received test extracts in a dose of (25, 50, 100 mg / kg, i.p.) respectively, 1 hr before milk injection. Blood samples were collected from each mouse from retro-orbital plexus under light ether anesthesia. Total eosinophil count was done in each group before drug administration and 24 hr after milk injection. Blood was sucked in WBC pipette up to mark and further diluted with WBC diluting fluid. Pipette was shaken for few seconds and kept aside for five min. Total eosinophil count was done in each group before administration of test compound and 24 h after milk injection. Difference in total eosinophil count before and after 24 h drug administration was calculated [4].

RESULTS

Table 1: Effect of CZPEE on Milk induced eosinophilia in mice

Group	Treatment (mg / kg, i.p.)	EOSINOPHIL COUNT
I	Control	44
II	Vehicle	8
III	CZPEE (25)	43
IV	CZPEE (50)	41

V	CZPEE (100)	40
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Statistically non-significant data (ANOVA followed by Dunnett's test)

n=5, values are expressed in mean±SEM

CZPEE – *Curcuma zedoaria* petroleum ether extract

Figure 2: Effect of CZPEE on Milk induced eosinophilia in mice

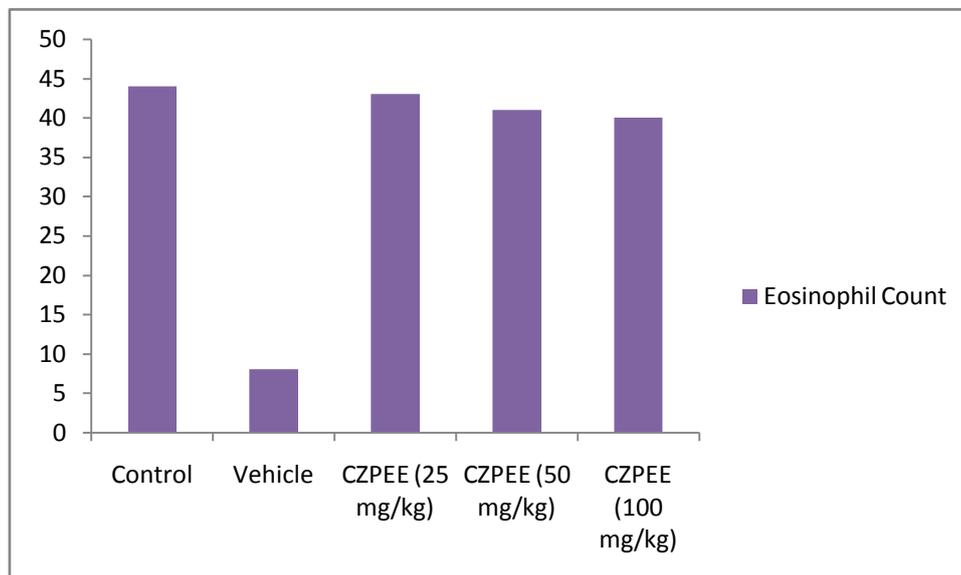


Table 2: Effect of CZEE on Milk induced eosinophilia in mice

Group	Treatment (mg / kg, i.p.)	EOSINOPHIL COUNT
I	Control	44
II	Vehicle	8
III	CZEE (25)	38
IV	CZEE (50)	25
V	CZEE (100)	17

n=5, values are expressed in mean±SEM

*p< 0.05 compared with control group (ANOVA followed by Dunnett's test)

CZEE – *Curcuma zedoaria* ethanol extract



Figure 3: Effect of CZEE on Milk induced eosinophilia in mice

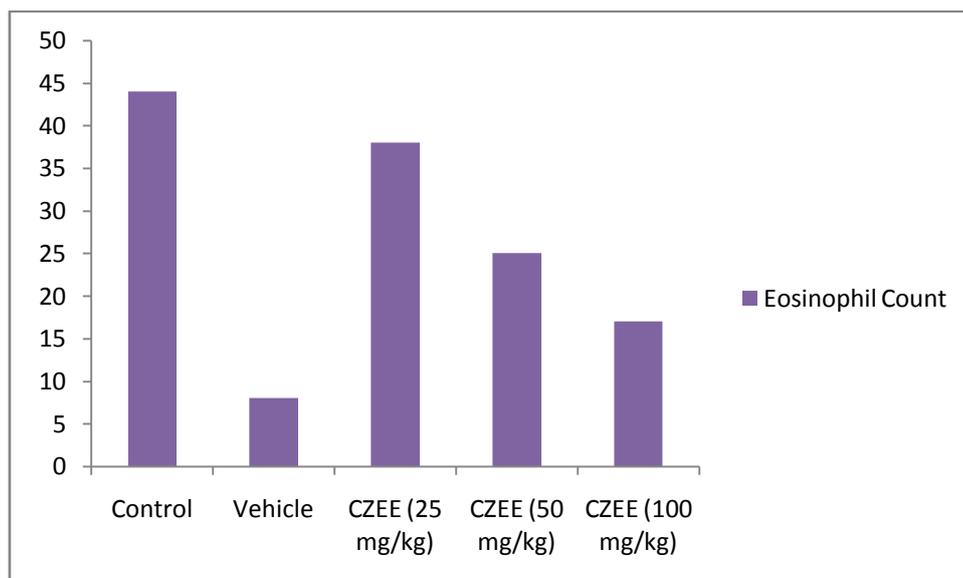
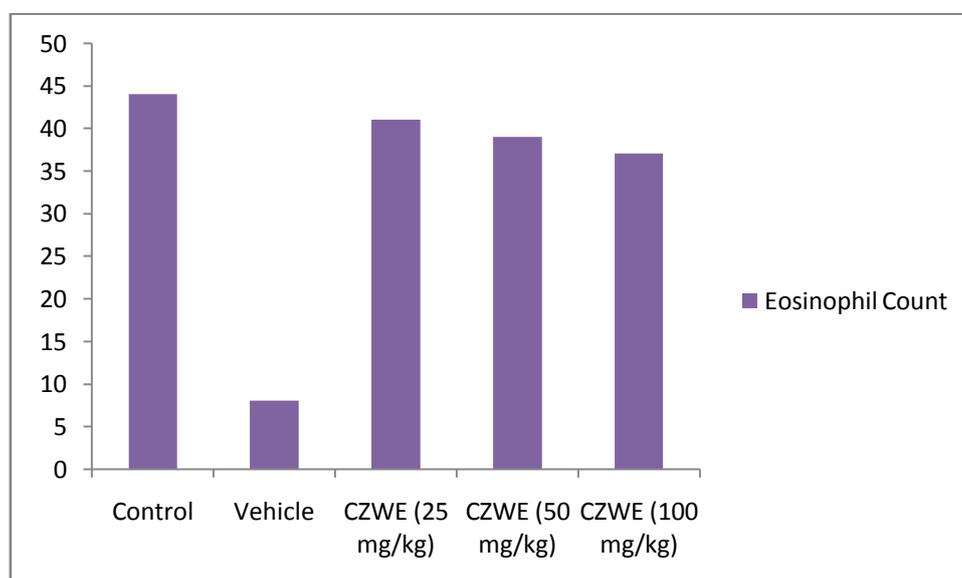


Table 3: Effect of CZWE on Milk induced eosinophilia in mice

Group	Treatment (mg / kg, i.p.)	EOSINOPHIL COUNT
I	Control	44
II	Vehicle	8
III	CZWE (25)	41
IV	CZWE (50)	39
V	CZWE (100)	37

n=5, values are expressed in mean±SEM
 Statistically non-significant data (ANOVA followed by Dunnett's test)
CZWE – *Curcuma zedoaria* Water extract

Figure 4: Effect of CZWE on Milk induced eosinophilia in mice



DISCUSSION

In the present investigation *Curcuma zedoaria* rhizome extracts at doses of (25-100 mg/ kg, i.p.) was evaluated for management of asthma using milk induced eosinophilia. Ability of petroleum ether, ethanol, water extract of rhizomes of *Curcuma zedoaria* (CZPEE, CZEE and CZWE) was tested to control the milk induced eosinophilla at varying doses of 25, 50, and 100mg/kg i.p. Treatment group of CZEE at a dose of (100 mg/kg, i.p.) significantly ($p < 0.05$) reduced milk induced eosinophilia (eosinophil count 17) compared to petroleum ether (Table 1 and Figure 2) water extracts (Table 3 and Figure 4). Table 2 and Figure 3 was implicative of CZEE potentiality in antagonizing the milk induced blood eosinophilia which is hall mark of allergic asthma as involvement of eosinophils into bronchial mucosa in which allergic inflammation occurs is a critical contributor to the late asthmatic reaction of congestion and mucus hypersecretion. Asthma involves various types of mediator in pathology. It was demonstrated that parental administration of milk produces a marked increase in the leukocytes and eosinophils count after 24 h of its administration [4],[5]. Leukocytes during asthmatic inflammation release the inflammatory mediators like cytokines, histamine, and major basic protein, which promote the ongoing of inflammation [6]. The infiltration of leukocytes potentiates the inflammatory process by the release of reactive oxygen species into the surrounding tissue, resulting in increased oxidative stress [7] and associated with many pathogenic features of asthma [8]. In this study we observed that leukocytes count was decreased in mice treated with CZEE at doses of 25-100 mg/kg significantly as compared to vehicle treated group. An abnormal increase in peripheral eosinophil to more than 4% of total leukocytes count is termed as eosinophilia. In asthmatic patient there is an increase in eosinophil count and mucus hypersecretion and airway hyperreactivity were stimulated [9],[10]. Eosinophils infiltrating the airway also have an effect on mucus secretion by epithelial goblet cells [11].

CONCLUSION

In our study it was observed that CZEE at doses of 25-100 mg/kg significantly decreased milk induced eosinophils count as compared to *Curcuma zedoaria* petroleum ether & water extract. The decrease in eosinophils count may be due to the presence of phytoconstituents. CZEE decreases eosinophil count by normalizing oxidative stress and/or adaptogenic activity, and decrease in eosinophils, may reduce type I hypersensitivity in asthma.

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