RESEARCH ARTICLE

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Pharmacological Investigation of *Curcuma caesia* in Management of Asthma

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Abstract: *Curcuma caesia* (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 various extracts of *Curcuma caesia* rhizomes to validate its traditional use. In the present study petroleum ether, ethanol and water extract of *Curcuma caesia* rhizomes at the doses of 25-100 mg/kg i. p. was evaluated for antiasthmatic activity using milk induced leucocytosis in mice. The results of present investigation showed that the ethanol extract of *Curcuma caesia* rhizomes at (25-100 mg/kg, i.p.) significantly decreases milk induced leucocytosis in mice in a dose dependent manner when compared to petroleum ether, water extract and control group. It can be concluded that the ethanol extract of *Curcuma caesia* (CCEE) may be used in management of asthma.

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 caesia Roxb. is a member of the family Zingiberaceae and popularly known as Kali 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. [1] Rhizomes of the plant are used for sprains and bruises and also employed in the preparation of cosmetics. [2] The effective use of *Curcuma longa* Linn. well known since a long time; it is laxative, anthelmintic and vulnerary, 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 ammation caused due to injuries. [3] 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. One of which is *Curcuma caesia* Family: Zingiberaceae. It is also known as "Kali Haldi." It is an erect rhizomatous herb with large leaves. Fresh rhizomes are aromatic with intense camphoraceous odour and are applied externally to sprain and bruises. [4] Black Turmeric (*Curcuma caesia*) is native to North-East and Central India. It is also sparsely found in Papi hills of East Godavari, the root hills of the Himalayas and North Hill forest of Sikkim. The rhizomes of Black Turmeric have a high economic importance owing to its putative medicinal properties. [2]

Rhizome large, 5-6 × 9-10 cm, (Figure 1) 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, (Figure 2) 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]

MATERIALS AND METHODS

Plant Material

Rhizomes of *Curcuma caesia* 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 caesia* 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 Leucocytosis

Mice were divided into five groups, five animals in each group. Animals belonging to Group-I serve as control and treated with vehicle 1 ml/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, 1 ml/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

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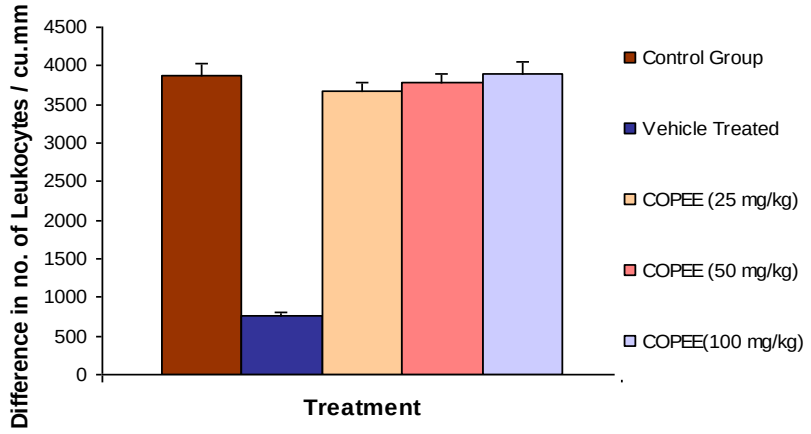

Figure 1: Effect of CCPEE on milk induced leukocytosis in mice

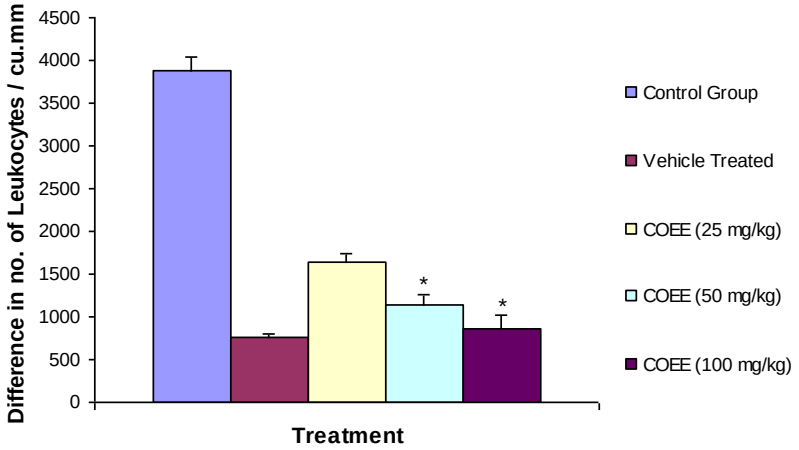

Figure 2: Effect of CCEE on milk induced leukocytosis in mice

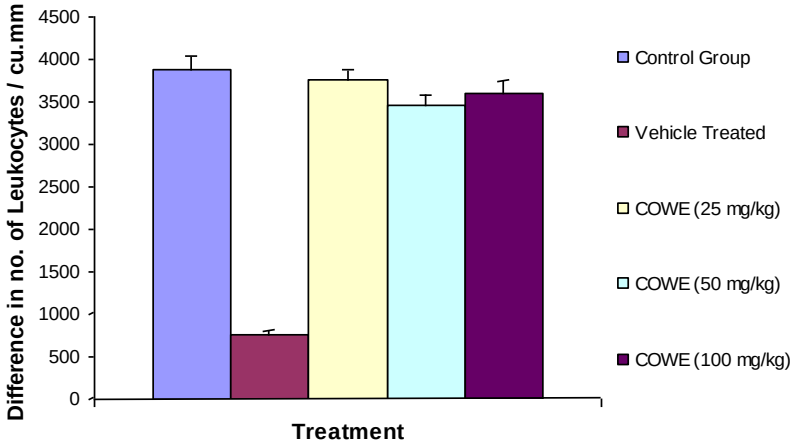

Figure 3: Effect of CCWE on milk induced leukocytosis in mice

milk injection. Blood samples were collected from each mouse from retro-orbital plexus under light ether anesthesia. Total leukocyte 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 leukocyte count was done in each group before administration of test compound and 24 h after milk injection. Difference in total leukocytes count before and after 24 h drug administration was calculated. [4]

RESULTS

Results are shown in Table 1 to Table 3 and Figure 1 to Figure 3.

DISCUSSION

In the present investigation *Curcuma caesia* rhizome extracts at doses of (25 - 100 mg/ kg, i.p.) was evaluated for management of asthma using milk induced leukocytosis. Pretreatment with *Curcuma caesia* rhizomes petroleum ether, ethanol and water extract at all three doses screened for the inhibition of leukocytosis. Only ethanol extract

Table 1: Effect of CCPEE on Milk Induced Leukocytosis in Mice

Group	Treatment (mg / kg, i.p.)	Leukocytes Count
I	Control	3880±159.68
II	Vehicle	755±40.23
III	CCPEE (25)	3675±102.36
IV	CCPEE (50)	3780±126.36
V	CCPEE (100)	3890±154.69

n=5, values are expressed in mean±SEM, Statistically non significant data (ANOVA followed by Dunnett's test), CCPEE – *Curcuma caesia* petroleum ether extract

Table 2: Effect of CCEE on Milk Induced Leukocytosis in Mice

Group	Treatment (mg / kg, i.p.)	Leukocytes Count
I	Control	3880±159.68
II	Vehicle	755±40.23
III	CCEE (25)	1640±102.26
IV	CCEE (50)	1150±112.98*
V	CCEE (100)	870±143.21*

n=5, values are expressed in mean±SEM, *p< 0.05 compared with control group (ANOVA followed by Dunnett's test), CCEE – *Curcuma caesia* ethanol extract

Table 3: Effect of CCWE on Milk Induced Leukocytosis in Mice

Group	Treatment (mg / kg, i.p.)	Leukocytes Count
I	Control	3880±159.68
II	Vehicle	755±40.23
III	CCWE (25)	3765±112.23
IV	CCWE (50)	3459±123.68
V	CCWE (100)	3598±148.74

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

significantly ($p<0.05$) at 50 and 100mg/ kg i.p was able to inhibit the leukocytosis (1150±112.98, 870±143.21 respectively). Notable percent inhibition of leukocytosis 70.36% and 77.57% offered by extract. Value of statistical significance shown in Table 2 and Figure 2 supports the adaptogenic potential of drug. 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 EECC at doses of 25-100 mg/kg significantly as compared to vehicle treated group. Result suggests that CCEE decreases milk induced leukocytes count by normalizing oxidative stress. 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] In our study it was observed that EECC at doses of 100-150 mg/kg significantly decreased milk induced eosinophils count. The decrease in leukocytes and eosinophils may be the presence of these phytoconstituents. EECC decreases leukocytes count by normalizing oxidative stress and/or adaptogenic activity and decrease in eosinophils, may reduce type I hypersensitivity in asthma. In conclusion, *Curcuma caesia* ethanol extract is found to be effective in the management of asthma.

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