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Potential effect of *Curcuma Zedoaria Rosc* root extracts in arthritic rats

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Abstract
Curcuma zedoaria Rosc (CZ) is commonly known as white turmeric useful in crippling arthritic and frozen joint in traditional Siddha medicine. The aim of study was to investigate the potential anti-arthritic effects of petroleum ether, chloroform and ethanol extracts of C. zedoaria roots on Freund's complete adjuvant-induced arthritis in rats. The CZ roots powder was successive extracted with petroleum ether, chloroform and ethanol. The paw volume and body weight were measured by using a Plethysmometer on 0, 3, 7, 14, 21 and 28 days. Hematological parameters, vascular permeability and histopathology were carried out at 28 days. The results indicate that regular treatment of CZ root extracts showed significant decrease paw edema from 3 to 28 days in all groups. Petroleum ether, chloroform extract and ethanol extract showed that test drug treated groups achieved near to the normal value of ESR, Hb, RBC and WBC. The serum nitric oxide and vascular permeability showed significant inhibitory effects. Histopathology examinations were showed protective effects in the joint of all treated groups compared with the control group. The data suggest that petroleum ether, chloroform and ethanol extract 200 mg/kg produced significant anti-arthritic effects and petroleum ether 200 mg/kg showed highly effective against arthritis.

Keywords: curcuma zedoaria rosc root, arthritis, complete freund's adjuvant**,** siddha medicine

1. Introduction
Curcuma zedoaria Rosc (family *Zingiberaceae*) consist of dried pieces of rhizome and a large perennial herb with underground tuberous root-stock, growing widely in the eastern Himalayas and in the most deciduous forest of the central region of Karnataka and Kerala, India [1]. Traditionally it has been used as an analgesic, anti-inflammatory, diuretic, antiallergic, anti-asthmatic, ulcer, menstrual disorders, Vomiting and improves blood circulation [2]. Traditionally it has been addressed that the roots of *Curcuma zedoaria* Rosc are used to treat crippling arthritis and frozen joints in traditional Siddha medicine [3]. Scientifically studies of this plant have been proved antimicrobial, antifungal, antiamoebic, Larvicidal, analgesic, antinociceptive, antiallergic, antiulcer, platelet activating, Hepato protective, antivenom, anti-inflammatory, Hem agglutinating, antimutagenic, Cytotoxic, anticancer, and antioxidant activity [4-5]. *Curcuma zedoaria Rosc* root-stock contain a large number of phytoconstituents namely, essential oil, bitter resin, carbohydrates aminoacid organic acid, gum, starch sugar, Curcumanoids (curcumin, demothxycurcumin and bisdemothxycurcumin), steroids and terpenoids which are responsible for the anti-inflammatory and anti-arthritic effects [6-8]. Rheumatoid arthritis (RA) is one of the major autoimmune diseases of global prevalence. It is a systemic disorder of unknown etiology characterized by a relapsing and remitting course of joint inflammation and symmetric progressive destruction of arthritic joints [9]. Conventional medicine, including treatment with steroids, non-steroidal anti-inflammatory drugs (NSAIDs) and Disease modifying ant rheumatic drugs (DMARD) are useful in the treatment of arthritis. However, these drugs are associated with unpleasant side effects such as gastrointestinal disturbances and cardiovascular risks [10-11]. Recently, efforts has been made to use the biological therapy, including TNFα, IL_1, IL_6, IL_{15} and anti-CD28 mAbs, anti-CD4 mAbs and anti-CD52 mAbs for the management of RA shown only limited success against all forms of arthritis and considering that the potential adverse activities of these drugs, like multiorgan failure, life-threatening infections, malignancies and immunogenic reactions as well as their limited ability to provide long-term remission [12]. Newer conventional drugs and complementary and alternative medicine (CAM) including herbs are continuously being sought [13]. Herbal treatments are now the most popular CAM therapy and are receiving increasing public interest. This growing trend warrants a continuous search for new natural anti-arthritic drugs. Traditional Indian medicine (TIM) offers a variety of herbal CAM products that have been used in the treatment of patients with chronic inflammatory disorders for several decades [14]. However many of these plants have been validated experimentally used in arthritic but not cure on the basis of conventional drug treatment schedule of RA. *C. zedoaria Rosc* has property which contains curcuninoids, steroids, terpenoids and alkaloids. These active constituents may be long useful for curing arthritic conditions. Since the advocated potential of *Curcuma zedoaria Rosc* on arthritic was tested rigorously by scientifically controlled experiments. We are interested in identifying and developing clinically useful and safe herbal medicines and this study was undertaken to investigate the anti-arthritic potential of root extracts of *Curcuma zedoaria Rosc* using FCA-induced arthritic rat model.

2. Materials and Methods
2.1 Plant material
The matured roots of *Curcuma zedoaria* were collected during February 2009 from Cochin, Kerala, India. The roots were identified by Dr. A. K. S. Rawat, Scientist-E, National Botanical Research Institute, Lucknow, India (Specification no NBRI-SOP-202).

2.2 Extraction methods
The roots were dried and the powder was subjected to successive extraction with petroleum ether (40-60°C), chloroform and methanol using soxhlet extraction method [15]. The petroleum ether, chloroform and ethanol extracts were subjected to preliminary qualitative chemical analysis by the standard procedures for identification of various phyto constituents [16].

2.3 Animals
Female Wistar rats age between 2 and 3 months and weighing 160 ± 40 g were selected for the study. The study was approved by the Institutional Animal Ethical Committee of K. L. E.'S College of Pharmacy, Belgaum, India (Resolution No. 31/7/2010-13).

2.4 Acute Toxicity Study
The acute toxicity study was carried out according to the guidelines set by CPCSEA, OECD (425). Starting dose was selected to be 175, 550, 1775, 2000, mg/kg body weight and finally, a dose of 5000 mg/kg b.w. for each extract was evaluated for toxicity. All these extracts were subjected to female Wistar rats and $1/10^{th}$ of the LD_{50} dose was selected for the pharmacological activity [17].

2.5 Preparation of test samples
Each extract dissolved in normal saline and triturate with Tween 60 made suspension for oral administration to rats. The rats were divided into six different groups, containing 6 animals in each group (n=6). The animals were divided into different groups as follows:
Group-I: Mineral oil + Saline p.o.
Group-II: CFA + Normal Saline p.o Control
Group-III: CFA + 10 mg/kg Indomethacin (i.p) Standard-I
Group-IV: CFA + Petroleum ether extract 200 mg/kg (p.o) [PEE-I]
Group-V: CFA + Chloroform extract 200 mg/kg (p.o) [CE-I]
Group-VI: CFA + Ethanol extract 200 mg/kg (p.o) [EE-I]

2.6 Induction of arthritis
Baseline pre-induction was made prior to injection of mineral oil or Freund's Complete Adjuvant (FCA) and then measured the left and right paw volume of each animal. For the induction of arthritis, rats were anaesthetized with 40 mg/kg thiopentone sodium intra-peritoneal injections. Once anaesthetize, left ankle joint was injected with 0.1 ml of FCA, containing 0.1 mg Mycobacterium tuberculosis [18]. The tarsal area of hind paw was grasped and the fossa distal and medial to the 'lateral malleolus' of the fibula was palpated. A 26 gauge needle was introduced into the capsule of the tibiotarsal joint percutaneously by directing it cephalad, mesiad and superiorly from the midpoint of the 'inframalleolar fossa,' until a distinct loss of resistance was felt approximately 4 mm and complete adjuvant or vehicle injected. With a true intra capsular injection, a firm resistance to injection was characteristically felt after the injection of 0.1 ml of fluid [19-20]. The following Parameters were selected for the evaluation of Anti-arthritic activity.

2.6.1 Paw edema
The severity of adjuvant arthritis was quantified by measuring the volume of hind paw using Plethysmometer. Paw volume (ml) was measured on days 0, 3, 7, 14, 21, 28, 35, and 42 after arthritic induction. Data were expressed as the increased volume with respect to day 0 volume [21].

2.6.2 Measurement of physiology profile
Changes in body weight were observed at 3, 7, 14, 21, 28, 35 and 42 days. All animals were anaesthetized and blood was collected from retro-orbital plexus of the entire arthritic and non-arthritic animals in plain and EDTA containing a tube, respectively. Samples were subjected to physiological examinations like Hemoglobin level, Erythrocyte Sedimentation Rate (ESR), Red blood cell (RBC), White blood cell, (WBC) and platelet counts (Neutrophils, Lymphocytes and Monocytes) [22].

2.6.3 Nitric oxide synthesis
Serum was separated from each group of animals. Sodium nitro prusside (5 Mm) in standard phosphate buffer solution with different serum samples dissolved in standard phosphate buffer (0.025 M, pH 7.4) solutions and an incubated in equal amount at 25^0 for 5 h. After 5 h, 0.5 ml of incubation solution was removed and diluted with 0.5 ml of Griess reagent. The absorbance was read at 546 nm using Shimadzu UV-Visible spectrophotometer [23].

2.6.4 Assessment of vascular permeability
Evan's blue (50 mg/kg) was administered via the jugular vein into the anaesthetized rat. After 4 h, the anterior and posterior synovial capsules and fat pad were dissected from each ankle joint, which were small thus, tissues obtained from four ankles were grouped to form one sample. The samples were then weighed, and the amount of Evans blue in the sample was estimated using dye extraction technique, the synovial capsule was cut into smaller pieces and mixed with acetone containing 1% Na_2SO_4 in the ratio of 7:3. The samples were shaken gently and continuously for 24 h at room temperature. Each preparation was centrifuged for 10 min at 2000 rpm and 2 ml of the supernatant was separated for measurement of absorbance at 620 nm using Shimadzu UV/Visible spectrophotometer (Model UV 1800). The amount of dye recovered was calculated by comparing the absorption of the fluid with that of the standard curve prepared with known concentration of Evan's blue solution [24].

2.6.5 Histopathology examination
Animals were sacrificed 42 days after the induction of arthritis. The left ankle joint was removed and post fixed in 10 % formalin (10 days) and then decalcified in 5% formic acid the left hind paws were removed from all groups of animals and post fixed in normal saline and then decalcified in 5% formic acid. Joints were then trimmed, embedded and sectioned at 6 µm. Sections were then stained with haematoxyline and eosin. Pathology lesions of rats ankle joint were graded on a blind scale under light microscopic 100x [25]. Histological evaluation was carried out according to the following scale Nil 0, Mild 1, moderate 2 and marked 3 skin congestion, skin odema, skin inflammatory infiltration, synovial ulceration, synovial nutro philic infiltration, synovial lymphocytic infiltration, synovial macrophages, synovial granulation tissue, synovial granulations tissue, synovial cellular degeneration, cartilage destruction and bone destruction. The values are expressed as means ±S.E.M. The results were analyzed statistically by one-way ANOVA followed by Dennett's multiple comparison tests using Graph pad prism version. The difference was considered significant when $^a p < 0.001$, $^b p < 0.01$, $^c p < 0.05$.

3. Results

3.1 Acute Toxicity Study

No toxic effects were observed at a higher dose of 2000 mg/kg in Wistar female rats. Hence, 1/ 10th dose was taken as effective dose (therapeutic dose). The cut off value of LD_{50} was 200 mg/kg have been selected for evaluating anti-arthritic activity.

3.2 Anti-arthritic Activity

3.2.1 FCA-induced rats paw edema

Significant *(p<0.001)* progressive increase in paw edema was observed in the control group as compared to the normal group. However, standard-I group showed significant *(p<0.001)* reduction in rat paw edema on day 3 to 28 days but *C. zedoaria* extracts treated groups showed significant *(p<0.01)* reduction on 3rd day and highly significant *(p<0.001)* reduction was observed in rats paw edema on 7 to 28 days of study except ethanol and aqueous treated groups shown in Table 1.

Table 1: Effect of *C. zedoaria* root extracts on FCA-induced changes in paw edema

Paw Edema (ml)						
Treatment Groups (n=6) (Dose mg/kg)	**0 day**	**3rd day**	**7th day**	**14th day**	**21st day**	**28th day**
Normal	0.042±0.020	0.51±0.073	0.43±0.078	0.06±0.033	0.045±0.022	0.047±0.025
Control	0.028±0.016	2.400±0.144[a]	2.367±0.117[a]	2.417±0.117[a]	2.417±0.114[a]	2.283±0.095[a]
Indomethacin-10	0.018±0.009	1.567±0.084[a]	1.667±0.072[a]	1.650±0.077[b]	1.033±0.096[a]	0.900±0.094[a]
Pet. ether extract-200	0.025±0.011	1.517±0.142[b]	1.100±0.137[a]	1.223±0.152[a]	1.113±0.226[a]	0.942±0.178[a]
Chloroform extract-200	0.033±0.014	1.550±0.245[b]	1.600±0.137[a]	1.427±0.168[a]	1.198±0.129[a]	0.972±0.087[a]
Ethanol extract-200	0.035±0.016	1.583±0.111[a]	1.917±0.172[c]	1.633±0.133[b]	1.292±0.120[a]	1.069±0.084[a]

Values are expressed as mean ± S.E.M. for six rats in each group. The control group compared with normal group and drug treated groups. P value less than 0.05 was considered as significant [c]*P<0.05* significant, [b]*P<0.01* most significant and aP *<0.001* highly significant.

3.2.2 Changes in body weight

Although the weights were almost identical in all groups of animals at 0 to 7 days during the subsequent course of disease. The body weight always declined in control group from 14 day to 42 days. In normal group increase in body weight were observed on the subsequent days, whereas standard-I, petroleum ether, chloroform and ethanol extracts groups slightly reduced the body weight at 3rd day to 7th day but improvement in body weight were observed from 14th day to last day of the experiment. Table 2.

Table 2: Effect of *C. zedoaria* root extracts on FCA-induced changes in body weight

Body Weight in Days						
Treatment Groups (n=6) (Dose mg/kg)	**0 day**	**3rd day**	**7th day**	**14th day**	**21st day**	**28th day**
Normal	157.8±7.314	161.3±4.787	161.3±4.787	161.5±4.478	166.3±4.240	166.3±4.57
Control	172.0±12.45	168.3±12.33	170.2±13.04	160.8±11.90	161.8±10.71	145.5±9.422[c]
Indomethacin-10	167.8±5.095	160.2±4.078	159.7±4.153	161.3±4.394	163.7±4.688	166.3±4.055
Pet. ether extract-200	159.8±8.167	156.7±7.740	156.5±7.274	158.8±7.670	160.0±7.815	161.3±8.417
Chloroform extract-200	182.8±18.97	179.8±18.40	179.7±18.48	182.2±19.02	184.5±18.59	186.3±18.13
Ethanol extract-200	177.5±14.81	176.7±14.85	177.3±15.07	181.2±14.89	184.0±14.70	187.2±15.28

Values are expressed as mean ± S. E. M. for six rats in each group. Each group compared with 0 day to 3, 7, 14, 21 and 28 days. P value less than 0.05 was considered as significant. [c]*P <0.05* significant, [b]*P<0.01* most significant and [a]*P <0.001* highly significant.

3.2.3 Haematological profiles

FCA-induced arthritic rats at 28 days showed slight elevation in the total WBC count and reduction in RBC. However, significant *(p<0.001)* increased in ESR was observed while the haemoglobin was significantly *(p<0.001)* reduced in the control group when compared with normal group. However, recovery in RBC and WBC count were observed in the standard I, petroleum ether, chloroform and ethanol extract treated groups. Whereas, significant *(p<0.001)* recovery in Hb content, ESR level was observed in petroleum ether treated groups when compared with the control group. The ethanolic and aqueous extracts treated groups showed no achievement in haematological aspects. Table 3.

Table 3: Effect of *C. zedoaria* root extracts on FCA-induced changes in hematology profile

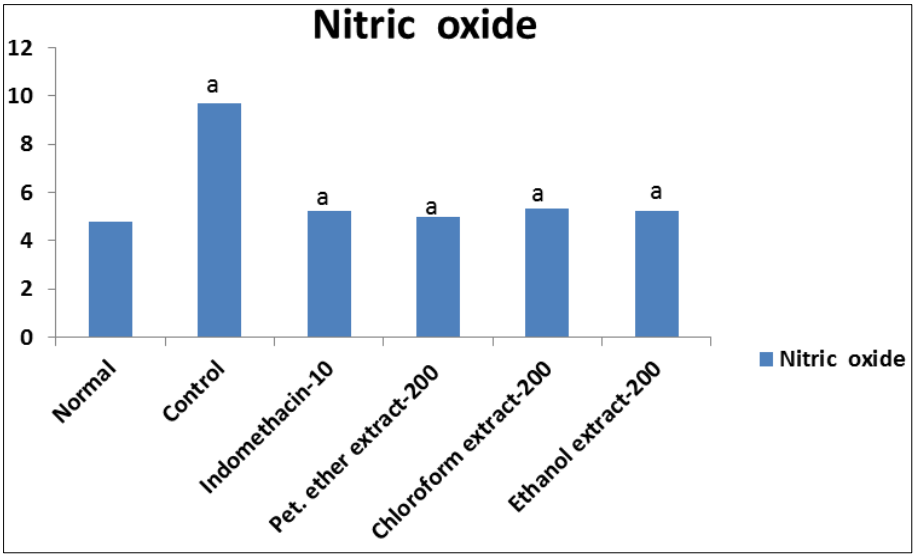
Hematology Profile				
Treatment Groups (n=6) (Dose mg/kg)	**Hemoglobin g/dl**	**ESR mm/h**	**WBC ×10³/mm³**	**RBC×10⁶/mm³**
Normal	14.13±0.604	3.817±0.142	10.37±0.436	7.014±0.352
Control	11.58±0.292c	12.42±0.86[a]	11.98±0.632	6.867±0.563
Indomethacin-10	13.50±0.183[a]	5.750±0.519[a]	10.65±0.489	6.800±0.139
Pet. ether extract-200	13.80±0.198[a]	5.683±0.233[a]	10.75±0.606	6.933±0.2459
Chloroform extract-200	13.62±0.268a	5.650±0.291[a]	10.85±0.504	7.033±0.2246
Ethanol extract-200	1357±0.414[a]	4.433±0.373[b]	10.95±0.408	6.95±0.396

Values are expressed as mean ± S.E.M. for six rats in each group. The control group was compared with normal groups and drug treated groups were compared with the control group. P value less than 0.05 was considered as significant [c]*P<0.05* significant, [b]*P<0.01*most significant and [a]*P <0.001* highly significant.

3.2.4 Nitric oxide level

Serum nitric oxide (NO) levels were significantly *(p<0.001)* elevated to about twice the normal level of control group compared to normal group which was considered as 100%.

But in contrast, standards and extract treated groups showed significant *(p<0.001)* reduction in the level of nitric oxide in arthritic rats compared to control group. These findings confirm the presence and role of nitric oxide in rheumatoid arthritis and the inhibitory effect of treatment on nitric oxide synthesis that would explain the possible mechanism of anti-arthritic activity. Figure 1.

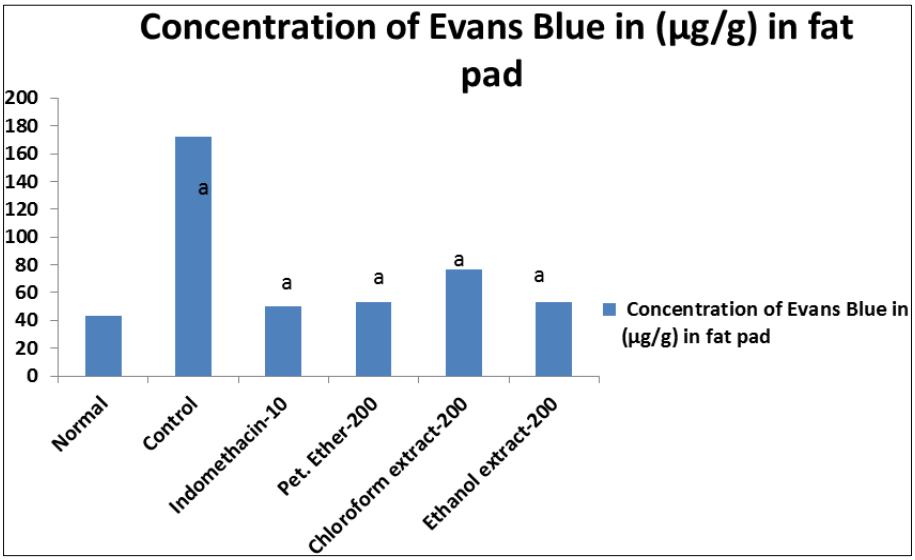


Values are expressed as mean ± S.E.M. for six rats in each group. The control group compared with normal group and drug treated groups were compared with the control group. P value less than 0.05 was considered as significant $^{c}P<0.05$ significant, $^{b}P<0.01$ most significant and $^{a}P<0.001$ highly significant.

Fig 1: Effect of *C. zedoaria* root extract on FCA-induced serum nitric oxide synthesis

3.2.5 Vascular permeability

Evans blue extravasation showed significant *(p<0.001)* augmentation in extravasations in FCA-injected ankle joints of control group compared with normal group. However, all drugs treated groups produced significant *(p<0.001)* inhibition of Evans blue extravasation in arthritic joints of rat compared with control groups. Figure 2.



Values are expressed as mean ± S.E.M. from six rats in each group. The control group compared with normal group and drug treated groups were compared with the control group. P value less than 0.05 was considered as significant $^{c}P<0.05$ significant, $^{b}P<0.01$ most significant and $^{a}P<0.001$ highly significant

Fig 2: Effect of *C. zedoaria* root extracts on FCA-induced vascular permeability

3.2.6 Histopathology of joints

The tissue sections of control joint of arthritis rats revealed the pathological changes that can be correlated with arthritis as compared to the normal joint (Fig. 4). In control group the joint showed marked damage. However, standard-I, petroleum ether, and chloroform extract treated groups showed marked protection against the injury to hind paw tissue sections and most of the histological changes were minimized and found negligible as compared to arthritis control group. Whereas the treatment with ethanol extract showed mild protective effect on FCA-induced arthritis in rats joint. Figure 3.

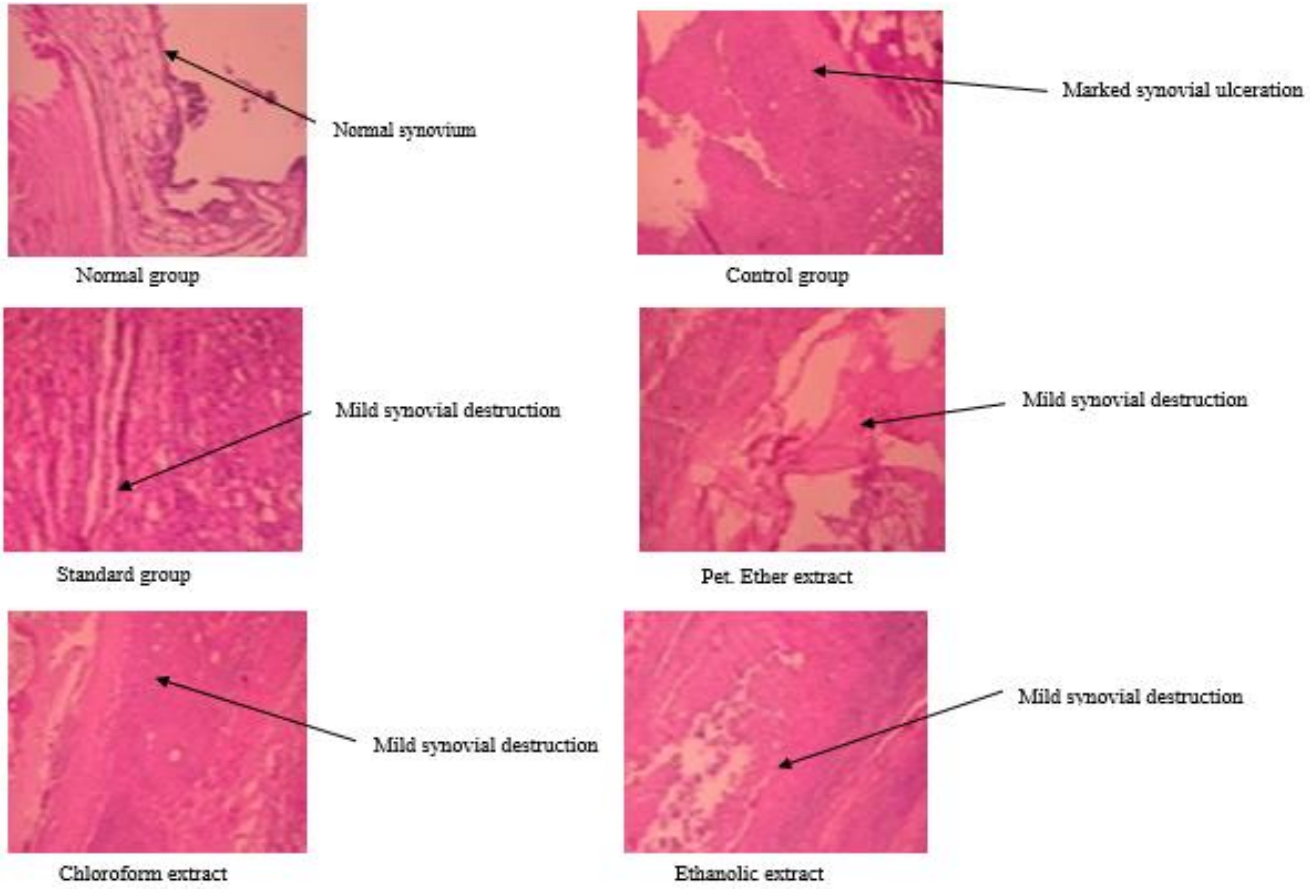


Fig 3: Effect of *C. zedoaria* root extracts on histology of FCA-induced histopathological changes in arthritic rats.

4. Discussion

In present study Freund's Complete Adjuvant (FCA) was used to induce arthritis in rats to investigate the potential effect of petroleum ether, chloroform and ethanol extracts of *C. zedoaria* Rosc root in arthritic rats [17]. Preliminary phytochemicals study revealed that petroleum ether, chloroform and methanol extracts of *CZ* presence of carbohydrates, proteins, amino acids, curcuminoids, steroids, terpenoid, glycosides, alkaloids, tannins and phenolic compounds. However, absence of curcuminoids, glycoside and alkaloids in methanol extract therefore the presence of curcuminoids, steroids and terpenoids in *CZ* extracts are used as anti-inflammatory. It was hypothesized that anti-arthritic activity with petroleum ether and chloroform extracts might be because of these active constituents. It has been well reported in literature curcuminoids (curcumin, demetho xycurcumin and bis demetho xycurcumin) inhibit TNF-induced NF-kB activation, curcumin modulate the inflammatory response by down regulating the activity of cyclooxygenase-2 (COX-2), lipoxygenase, and inducible nitric oxide synthase (iNOS) enzymes; inhibitory the production of the inflammatory cytokines Tumor necrosis factor alpha (TNF-α), interleukin 1, 2, 6, 8 and 12 monocyte chemo attractant proteins (MCP) [26]. Curcumin is thought to suppress NF-kB activation and proinflammatory gene expression by blocking phosphorylation of inhibitory factor I kappa B kinase (IkB). Suppression of NF-kB activation subsequently down regulate COX-2, and iNOS expression, inhibiting the inflammatory process. Steroids block allergic reactions and reduce the symptoms of itching, swelling and redness of skin and synthesis of certain enzymes that reduced inflammation and also suppress immune system. One of the most family of natural product for their medicinal value is terpenoids have been used anti-inflammatory which reduced production of Prostaglandin E_2 (PG_2) and also suppress the NF-kb and iNOS [27]. In chronic inflammation the CFA joint is manifested as a progressive increase in the volume of the injected paw. It is noteworthy that the inhibitory effect of extracts on the volume of the injected paw was comparable with that of standard-I (Table 1). The significant reduction in paw edema was observed treatment with petroleum ether and chloroform root extracts of *CZ* from third day to last day of study. The body weight as an indirect index in restoration of health suggests that the decrease in the body weight during inflammation is due to deficient absorption of nutrients through the intestine and that treatment with anti-inflammatory drugs normalizes the process of absorption [28]. Dramatic cessation of growth and decline in body weight was indicated in a control group of animals from 14 day to last day of study. Restoration and gain in body weight was evident, which indicate that improved body weight treatment with petroleum ether, ethanol and chloroform extracts. It has been reported that haematological characteristic alterations such as the reduction in RBC, haemoglobin and lymphocytes whereas increased WBC count, ESR, Neutrophils and monocytes occurs in arthritic conditions [29]. In present study similar results were showed that the reduction in the Hb count during arthritis due to reduced erythropoietin levels, a decreased response of the bone marrow erythropoietin and premature destruction of red blood cells. Similarly, an increase in the ESR is attributed to the accelerated formation of endogenous proteins such as fibrinogen and a/b globulin, and such a rise in the ESR indicates an active but obscure disease a moderate increase the WBC count due to an IL-1B mediated rise in the respective colony-stimulating factors [30]. The present study indicates that petroleum ether, chloroform

and ethanol extracts, standard-I treatments tend to normalize the hematological conditions such as Hb, ESR, RBC, WBC, monocytes, lymphocytes and Neutrophils. However, more promising results were obtained with petroleum ether extracts indicating more efficacious in recovering from CFA-induced arthritis. No significant difference was observed in serum creatinine level in normal, control and drug treated groups. The study indicates biochemistry profile after 28 day drug treatments only slight changes were observed in control and drug treated groups which proved any type of toxicities or adverse effect were not found on kidney and liver in arthritic rats. Previous reports have implied that Serum nitric oxide synthesis is produced by inducible nitric oxide synthase (iNOS) has been demonstrated in rheumatoid arthritis [31]. It has been expressed by several types of cells including macrophage, neutrophils, endothelial cells, chondrocytes and synovial [32]. Increased level of stable nitric oxide metabolic products nitrate and nitrite were detected in serum, urine and synovial fluid and their concentration was related to disease progression. The results obtained from present study are in the same line with the previous studies. The level of serum nitric oxide was significantly increased in CFA treated arthritic rats but in contrast serum nitric oxide level was reduced in all drugs treatment groups. These finding confirms the presence role of nitric oxide in rheumatoid arthritis and inhibitory effect of treatment on nitric oxide synthesis would explain the possible mechanism of anti-arthritic activity (Figure1) [33-34]. It has been reported that intra articular injection of CFA will cause a self-limiting increase in vascular permeability leading to persistence joint swelling within 7 to 14 days. It has been hypothesized, that it forms a complex with the bound large plasma proteins and Evan's blue that can pass through the endothelial gaps only if the endothelial gaps are enlarged. The present study, a significant augmentation in extravasations of Evans blue was observed in control rats. In contrast infiltration inhibitory effect was observed in all drug treated group. The results showed that among these extracts the petroleum ether extract at dose (200 mg/kg) have shown highly inhibitory effects on vascular permeability it was near to standard drugs indomethacin (Figure 2). On the basis of microscopic histopathological examination (Figure 3) the arthritic control group shown marked joint damaged as compared to normal joint. Whereas petroleum ether and chloroform treated joints were shown mild damaged however, ethanol extract treated joint shown marked damaged near to arthritic control, the above results suggest that the petroleum ether, chloroform and ethanolic root extracts of *Curcuma zedoaria Rosc* posses anti-arthritic effect [35].

5. Conclusion

On the basis of present the study indicated petroleum ether chloroform and extracts of *Curcuma zedoaria Rosc* showed anti-arthritic property due to the presence of curcuminoids, steroids and terpenoids, these active constituents inhibit the PG_2 Production, TNF-α activation NF-KB and iNOS. *Curcuma zedoaria Rosc* is single herb to have same line property of conventional drugs. Root extracts of *CZ* at 200 mg/kg have effective on CFA-induced arthritis in rats among these, extracts petroleum ether extract 200 mg/kg showed potential anti-arthritic effect. The findings of the present study suggested that the petroleum ether extracts obtained from roots of *Curcuma zedoaria Rosc* possess anti-arthritic properties, which is mediated via the inhibition of prostaglandin synthesis as well as central inhibitory mechanism. Therefore, the extract would be beneficial in the therapy of arthritis without any toxic effects.

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