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Research Article

**EFFECT OF TWO AYURVEDIC DRUGS ON SERUM CALCIUM
LEVEL IN OSTEOARTHRITIS INDUCED RATS AND
OSTEOARTHRITIS PATIENTS****J Viswanath¹, S Sankaraiah^{2*}, Chakrapani Cheekavolu³ Renu Dixit⁴ M. Naresh Kumar⁵
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Medical College, Guntakal, Andhra Pradesh, India.⁶Assistant professor, Department of Pharmacology, Tagore Medical College & hospital, Chennai,
Tamil Nadu, India.**Abstract:****Background:** To evaluate the comparative study of serum calcium level after treatment of *Cissus quadrangularis* linn and *Zingiber officinale* rocs in osteoarthritis induced rats and osteoarthritis patients.**Method:** Estimation of serum calcium levels are before and after treatment of tested drugs in osteoarthritis rats and patients
1. Animal treated: *Cissus quadrangularis* linn-450 mg/kg orally; *Zingiber officinale* rocs-450 mg/kg orally; *Cissus quadrangularis* linn+ *Zingiber officinale* rocs-450mg/kg orally; **2. Patients treated:** *Cissus quadrangularis* linn-5 gm; *Zingiber officinale* rocs-5 gm and *Cissus quadrangularis* linn+ *Zingiber officinale* rosc-5 gm, all groups are twice a day orally with luke warm water.**Results:** Serum calcium levels are estimated before and after treatment of tested drugs in osteoarthritis rats and patients were: **1. Animal treated:** *Cissus quadrangularis* linn (7.56 ± 0.35 to 9.06 ± 0.87) p<0.01; *Zingiber officinale* rosc was (7.82 ± 1.53 to 8.72 ± 0.68) p<0.05; *Cissus quadrangularis* linn+ *Zingiber officinale* rosc was (7.93 ± 0.73 to 9.72 ± 1.3) p>0.001; **2. Patients treated:** *Cissus quadrangularis* linn (8.295±0.3069 to 8.81±0.27) p<0.0001.; *Zingiber officinale* rosc was (8.160±0.13 to 8.20 ±0.13) p<0.001; *Cissus quadrangularis* linn+ *Zingiber officinale* rosc was (7.86 ±0.36 to 8.705±0.2724) p<0.0001.**Conclusion:** Study evident that improvement in terms of increase in serum calcium was observed in animal as well as patients treated groups. The combination treatment of *Cissus quadrangularis* linn+ *Zingiber officinale* rosc showed extremely significant and increase of serum calcium level compared to standard drug of Dexamethasone in both tested groups**Key words:** *Cissus quadrangularis* Linn, *Zingiber officinale* rocs, calcium, animals, patients**Corresponding Author:****S. Sankaraiah,**
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INTRODUCTION:

Ginger plants are cultivating many areas in the world either using as flavouring agent in food or herbal medicine. The *Zingiber* has been listed in "Generally Recognized as Safe" (GRAS) documented in US FDA. In a dose of 500 mg–1000mg of ginger powder administered 2-3 times a day period of 3 months to 2.5 years did not shown any adverse effects [1] and no teratogenic effects[2]. Ginger consists of 1.2% minerals, 2.4% fiber and 12.3% carbohydrates. On the other hand the powdered rhizome contains 3-6% fatty oil, 9% protein, 60-70% carbohydrates, 3-8% crude fiber, about 8% ash, 9- 12% water and 2-3% volatile oils as curcumin, zingiberene, terpinene, etc., The minerals present in ginger are iron, calcium and phosphorous. It also contains vitamins such as thiamine, riboflavin, niacin and vitamin A and C has been proved in earlier studies[3]. *Cissus quadrangularis* Linn; It is one of the valuable medicines in the Indian Traditional System. The various parts of plants products are used in asthma, dog bite, insect bite, as alterative and stomachic, in scurvy, menorrhagia and digestive disorders and also as anti-inflammatory, wound – healing, menstrual disorders, in epistaxis, helicon bactericidal activity and hypotension were used[4]. It also contains 0.14% of amyryne delta triterpene, 0.1% of amyryne delta triterpene and of 0.0003% of triterpene in Thailand specimen. It also contains calcium oxalate, carotene, vitamin-C, sitosterols, tetra terpenoid, amyryns and an anabolic keto steroid, and 3- ketosteroid, acetylcholine. Therapeutic effect of medicinal plants depends upon their chemical constituents [5] Present study deigned evaluates the comparative study of serum calcium level after treatment of *cissusquadrangularis* linn and *zingiber officinale* rocs in osteoarthritis induced rats and osteoarthritis patients.

METHODOLOGY:**I. Animal Study:****Induction of osteoarthritis in animals:**

Osteoarthritis was induced by giving a single intra-articular injection of 1 mg monosodium iodoacetate (MIA) (crystal powder M = 185.96 g/mol). MIA was dissolved in physiologic saline and administered in a volume of 50 μ L using a 30-gauge needle through the intra patellar ligament of the left knee. After the MIA injection a substantial inflammation of synovial joints was observed in this model. The general health of the animals was monitored. No signs of distress were seen.

Animal Experimental Groups:

The rats were weighed, divided into five groups (6 animals in each group) The drugs were

administered by using oral feeding needle for a period of 14 days, twice daily. Later the blood was taken either by puncturing retro-orbital plexus or from tail and it was measured for serum calcium. One normal control group was maintained to compare normal knee joint to disease induced knee joint.

1. The group I - Normal saline (control) orally.
2. The group II – Treatment of Dexamethasone in a dose of 8 ml/kg orally(Standard).
3. The group III – Treatment of *cissus quadrangularis* linn in a dose of 450 mg/kg orally.
4. The group IV – Treatment of *zingiber officinale* rosc. in a dose 450 mg/kg orally.
5. The group V – Treatment of both *cissus quadrangularis* linn and *zingiber officinale* rosc. in a dose of 450 mg/kg orally.

II. Human Study:**Treatment of osteoarthritis patients:**

The clinical study was carried out in total 60 patients in Department of Dravyaguna, S.V Ayurvedic Medical College, Tirupathi with treatment of *Cissus quadrangularis* linn powder and *zingiber officinale* rocs powder in osteoarthritis patients. Study was conducted after obtaining the institutional ethical committee approval from 2015 to 2016. The total patients were divided in to 3 groups (A,B,C) and treated in the interval of 15 days, each group consists of 20 patients and blood samples were collected and analyzed serum calcium level after treatment of tested drugs.

Treatment Groups:

1. Group A – Treatment of *Cissus quadrangularis* linn 5 gm/dose twice a day/orally
2. Group B - Treatment of *Zingiber officinale* rosc. 5 gm/dose twice a day/orally
3. Group C - Treatment of *Cissus quadrangularis* linn + *Zingiber officinale* rosc.5gm/dose all groups twice a day orally with luke warm water.

Statistical analysis:

The statistical package Graph Pad Prism 3.1 version was used to analyse all results. Values are expressed as mean \pm SEM. One way ANOVA followed by post hoc Dunnett's test was used for analysis of data and for comparisons between treated and control groups; p < 0.05 was considered significant.

RESULTS:

Table 1: Effect of herbal drugs on serum calcium in osteoarthritis induced rats

Groups	Dose /kg.	Serum calcium (mg/dl)	
		Mean \pm SEM	
		B.T	A.T
Group-I	-	-	-
Group-II	8ml/kg	7.96 \pm 0.45	7.03 \pm 0.14
Group-III	450 mg/ kg	7.56 \pm 0.35	9.06 \pm 0.87**
Group-IV	450 mg/kg	7.82 \pm 1.53	8.72 \pm 0.68*
Group-V	450 mg/ kg	7.93 \pm 0.73	9.72 \pm 1.3***

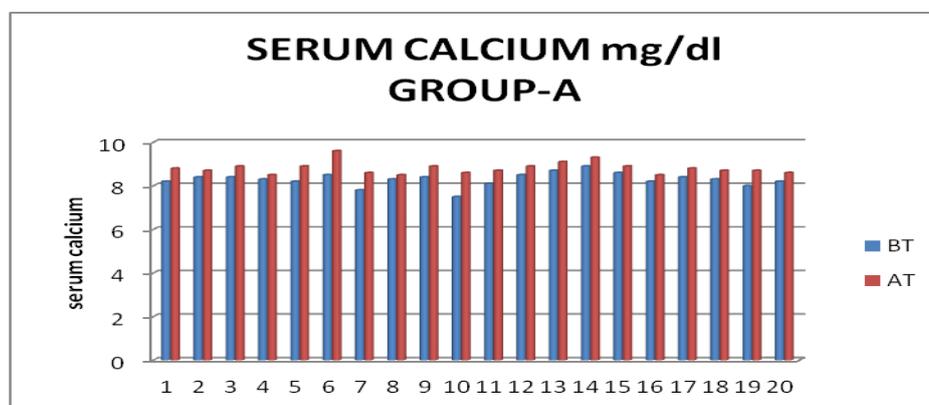
(B.T-Before treatment, A.T-After Treatment) * P<0.05 ** P<0.01 *** P<0.001

Table-1: It is evident from the above data table states that improvement in terms of increase in serum calcium was observed in all trial drug groups. According to the table initial mean \pm SEM before treatment to after treatment 7.56 \pm 0.35(B.T) to 9.06 \pm 0.87(A.T) in *Cissus quadrangularis* linn (Group-II) which is very significant (p<0.01); Group-III *Zingiber officinale* rosc was 7.82 \pm 1.53(B.T) to 8.72 \pm 0.68(A.T) which is Significant (p<0.05); Group-V combination of *cissus quadrangularis* linn and *zingiber officinale* rosc was 7.93 \pm 0.73(B.T) to 9.72 \pm 1.3(A.T)extremely significant (p>0.001). In standard group the serum calcium level was decreased from 7.96 \pm 0.45 to 7.03 \pm 0.14 which is not significant.

Table 2: Effect of herbal drugs on serum calcium in osteoarthritis patients

Serum Calcium	BT Mean \pm S.D.	AT Mean \pm S.D.	Within the group Paired' t' test value BT- AT	Mean difference	Between the group comparison oneway Anova F value
Group A	8.295 \pm 0.3069	8.81 \pm 0.2770	t = 8.924 p<0.0001 extremely significant	0.5150 \pm 0.2581	F = 36.806 P <0.0001 extremely significant
Group B	8.160 \pm 0.1314	8.205 \pm 0.1395	t = 3.327 p = 0.0018 very significant	0.045 \pm 0.6048	
Group C	7.865 \pm 0.3617	8.705 \pm 0.2724	t =10.686 p <0.0001 extremely significant	0.8400 \pm 0.3515	

Table-2; The data of the above table states that improvement in terms of increase in serum calcium was observed in all three groups. According to the table initial mean \pm SD increased from 8.160 \pm 0.1314 to 8.205 \pm 0.1395 in group 'B' which was statistically very significant (p<0.001). In group 'A' and 'C' the effect of trial drugs in serum calcium was extremely significant (p<0.0001). Inter group comparison was statistically extremely significant (p<0.0001) in all groups.

Fig1: Effect of *Cissus quadrangularis* linn on serum calcium in osteoarthritis patients

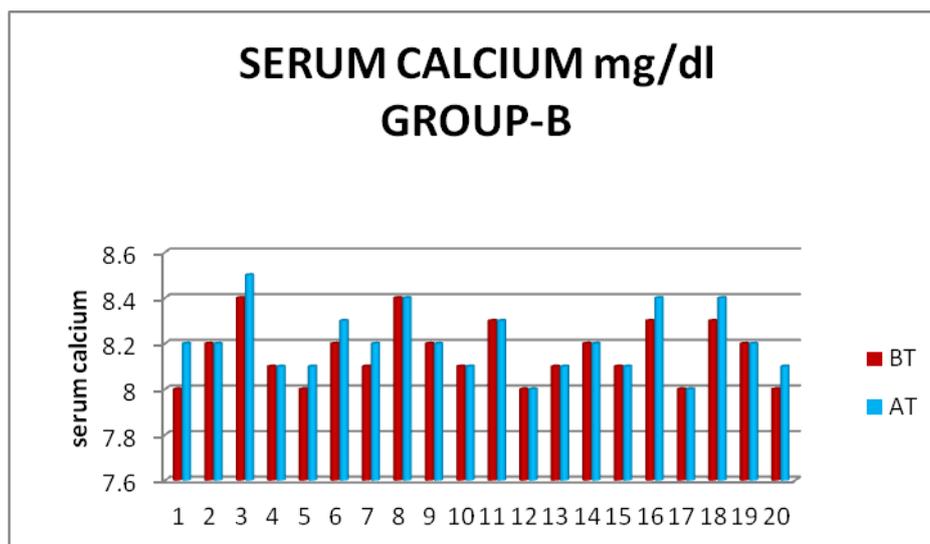


Fig 2: Effect of *Zingiber officinale rosc* on serum calcium in osteoarthritis patients

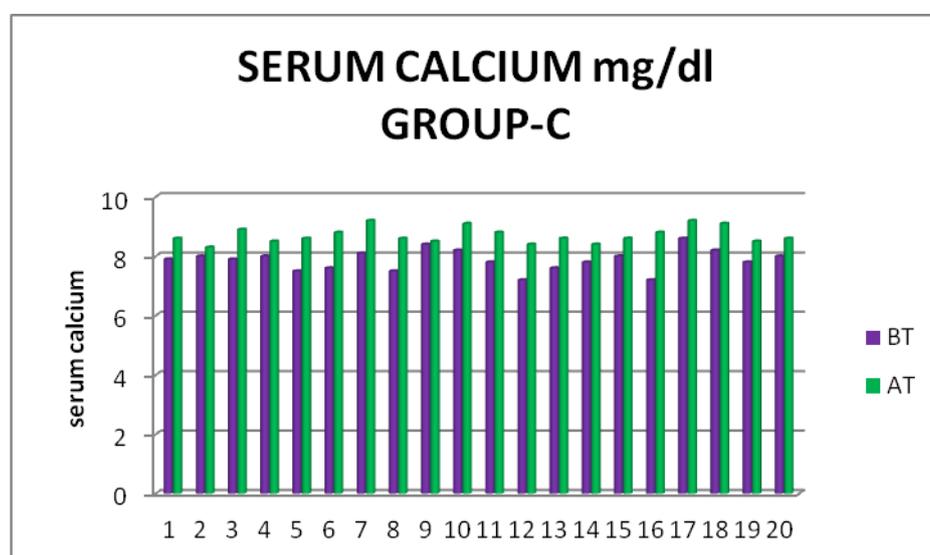


Fig 3: Effect of *Zingiber officinale rocs+ Zingiber officinale rosc* on serum calcium in osteoarthritis patients

DISCUSSION:

Osteoarthritis is a chronic degenerative joint disease and a leading to disability, affecting 60-70% of the population older than 60 years[6]. It is a slowly progressive disease characterized by reduction in proteoglycan aggregates within the joint cartilage matrix, leading to loss of cartilage, eburnation of bone finally leads to joint pain[7]. A previous study examined the incidence of horizontal cleavage lesions of the knee menisci in 100 random necropsy specimens and found that the coincidence of horizontal cleavage lesions and OA was frequent[8]. Several studies have demonstrated that meniscal degeneration is a general feature of OA knee joints as revealed by magnetic resonance imaging [9-11] and that meniscal degeneration contributes to joint space narrowing [12]. Calcium crystals are found in the knee joint fluid of up to

65% of OA patients [13]. Calcium crystals are also found in hyaline articular cartilage of OA patients [14]. There is a evidence indicating that these crystals may worsen joint degeneration. Injection of crystals into the knee joint of dogs induced a severe inflammatory response [15]. In cell culture, crystals stimulated mitogenesis [16] production of matrix metalloproteinase's [17] and inflammatory cytokines[18].Several proteins, including ectonucleotide pyrophosphates/ phosphodiesterase, progressive ankylosis homolog (ANKH),tissue nonspecific alkaline phosphatase and transglutaminase-2, have been implicated in pathological calcification in OA hyaline articular cartilage[19]. Present study evident that increase in serum calcium was observed in animal as well as patients treated groups. The combination treatment of *Cissusquadrangularis linn+ Zingiber officinale*

rosc showed extremely significant and increase of serum calcium level compared to standard drug of Dexamethasone in both tested groups, further study need to extend the mechanism of calcium increases in the treatment groups.

CONCLUSION:

Study evident that improvement in terms of increase in serum calcium was observed in animal as well as patients treated groups. The combination treatment of *Cissusquadrangularis* linn+ *Zingiber officinale* rosc showed extremely significant results and increase of serum calcium level compared to standard drug dexamethasone in both groups.

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Conflict of Interest: None declared

Ethical approval: Institutional Ethical committee approval obtained.

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