



SCREENING OF ANTI-RHEUMATOID EFFECT OF AQUEOUS EXTRACT OF *SESAMUM INDICUM* SEEDS IN FREUND'S COMPLETE ADJUVANT INDUCED ARTHRITIS IN WISTAR ALBINO RATS

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Conflicts of Interest: Nil

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Abstract:

Background: Rheumatoid arthritis (RA) is autoimmune disorder. It affects the all parts of the body. The present study aimed to screen the anti-rheumatoid effect of aqueous extract of *Sesamum indicum* seeds in Freund's complete adjuvant induced arthritis in Wistar Albino rats

Materials and Methods: Wistar Albino male rats weighing 180-200gm were used in this study. A total of 30 rats were divided into 5 groups each of 6 rats. G-I (Normal Saline 0.9%), G-II Freund's adjuvant (0.1 ml/0.5%), G-III Dexamethasone (0.5mg/kg), G-IV Aqueous extract of *Sesamum indicum* (400mg/kg) and G-V Aqueous extract of *Sesamum indicum* (800mg/kg). 28 days drugs were given to their respective groups. On 1st, 7th, 14th and 28th day blood samples were collected and serum was separated. The collected serum was used for the analysis of rheumatoid factor, C-reactive protein and erythrocyte sedimentation rate. Statistical Package for Social Sciences (SPSS 16.0) version used for statistical analysis.

Results: The study results showed that group-I showed significant effect compared to all other groups at 4 time periods. Group-II showed significant increase all the parameters compared to other groups. Group-III and V showed significant decrease in all the parameters compared to group-II. Group-IV showed significant effect with compared to group-I, II, III and V. Comparison between group-III and V not showed any significant effect.

Conclusion: High dose of aqueous extract of *Sesamum indicum* seeds showed significant decrease in ESR, CRP and RAF. The results are similar to standard drug.

Keywords: Aqueous extract, C-reactive protein, Dexamethasone, Rheumatoid arthritis, Rheumatoid factor, *Sesamum indicum* seeds

Introduction

Rheumatoid arthritis (RA) is a chronic inflammatory autoimmune disorder. It mainly affects the joints with varying severity among patients¹. It mainly damages the bone and cartilage leads to weakness of tendons and ligaments leads to distraction of joint². These autoimmune reactions in the joint lead to development of deformities and bone erosion, usually very painful for the person. The major symptoms of RA are morning stiffness, fatigue, fever, weight loss, joints are tender, inflammation, warm and sometimes rheumatoid nodules are seen in soft bone tissue^{3,4}. It can affect both genders at any age of lifetime mainly seen observed between the ages of 35-60 years⁵. Rheumatoid factor estimation is one of the tools to diagnosis the RA. It is normally treated with anti-inflammatory, immunosuppressants and antibodies. Disease modifying anti-rheumatoid drugs is commonly used to treat the RA. Long term use of these drugs produces the various serious adverse effects and sometime these drug many to be used due to other co morbid conditions^{6,7}. To overcome these limitations medical plant extracts are best choice. *Sesamum indicum*

seeds are commonly available. It has various pharmacological effects like anti-inflammatory, immunosuppressant, analgesic, anti-oxidant, hypolipidemic, wound healing, anti-hypertensive, ulcer protective and anti-cancer⁸⁻¹⁰. With this background of *Sesamum indicum* seeds the present study aimed to screen the anti-rheumatoid effect of aqueous extract of *Sesamum indicum* seeds in Freund's complete adjuvant induced arthritis in Wistar Albino rats

Materials and Methods

Animals

Wister Albino male rats weighing 180-200 g were used in this study. All the rats were obtained from Central Animal House. They were fed on standard rat pellet diet and water was provided in feeding bottle. All the animals were maintained under standard laboratory conditions temp 24 C and humidity 60-70% and 12h:12h dark and light cycle.

Collection of *Sesamum indicum* seeds and preparation of extract

Sesamum indicum seeds were purchased from local market. Dust and other waste materials were removed. Seeds were cleaned and dried under sunlight 3 days. Dried seeds were made into power with use of electric grinder. The powder was soaked in 500ml of water for 10 days. After 10 days the liquid was filtered and evaporated on water bath. Evaporation process was continued till to obtain thick dark brown extract. The extract was stored and used for whenever required to administer to rats.

Groups

Group-I: Normal Saline (0.9% orally/10ml/kg)

Group-II: Freund's complete adjuvant (0.1 ml/0.5%)

Group-III: Dexamethasone (0.5mg/kg)

Group-IV: Aqueous extract of *Sesamum indicum* seeds (400 mg/kg)

Group-V: Aqueous extract of *Sesamum indicum* seeds (800 mg/kg)

Procedure

Rats were induced arthritis by injecting 0.1 ml of 0.5% of Freund's complete adjuvant into the tibio tarsal joint of the left high paw. All the groups were given inducing agent except control group. Drugs were administered from 1st day to 28th days. Blood samples were collected from all the groups' rats for four times (1st, 7th, 14th and 28th) during study period. Serum was separated from the collected blood samples and used for the estimation of erythrocyte sedimentation rate, C-reactive protein and rheumatoid factor¹¹.

Statistical analysis

The data was expressed in mean and standard deviation. Statistical Package for Social Sciences (Version 16.0) used for analysis. One ANOVA (Post hoc) followed by Dunnett t test applied to find the statistical significant between the groups. P value less than 0.05 ($p < 0.05$) considered statistically significant at 95% confidence interval.

Results

Group-I showed significant difference in all three parameters compared to group-II, III, IV and V ($p < 0.05$). Group-II showed significant increase in ESR, CRP and RAF compared to other groups on 1st, 7th, 14th and 28th day. Group-III showed significant decrease ($p < 0.05$) in all the parameters compared to group-II and IV but not with group-V ($p > 0.05$). Low dose of seed extract of group-IV showed significant difference ($p < 0.05$) compared to group-I, II, III and V. Group-V showed significant difference ($p < 0.05$) compared all other groups except group-III. Standard drug and high dose of seed extract showed similar effect. Low dose of plant extract showed lesser effect compared to high dose (Table-1, 2 and Graph-1)

Table 1: Effect of aqueous extract of *Sesamum indicum* seeds on erythrocyte sedimentation rate of different groups

Groups	Day-1 ESR (mm/hour) (MEAN±SD)	Day-7 ESR (mm/hour) (MEAN±SD)	Day-14 ESR (mm/hour) (MEAN±SD)	Day-28 ESR (mm/hour) (MEAN±SD)
Group-I	7.45±1.24	7.53±1.45	7.19±1.16	7.21±1.46
Group-II	31.93±1.19*	40.19±2.76*	43.10±2.10*	39.29±2.04*
Group-III	16.72±1.34* [#]	17.19±1.45* [#]	19.23±1.93* [#]	16.19±2.04* [#]
Group-IV	22.19±2.67* ^{#,§}	26.19±1.45* ^{#,§}	31.34±1.83* ^{#,§}	27.19±1.34* ^{#,§}
Group-V	17.19±1.31* ^{#,}	18.21±1.67* ^{#,}	20.56±2.78* ^{#,}	17.23±2.47* ^{#,}

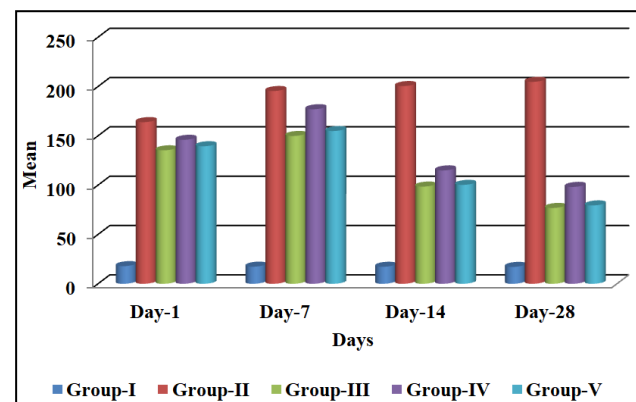
(* $p < 0.05$ significant compared group-I with other groups, # $p < 0.05$ significant compared group-II with other groups, § $p < 0.05$ significant compared group-III with other groups, || $p < 0.05$ significant compared group-V with other groups)

Table 2: Effect of aqueous extract of *Sesamum indicum* seeds on C-reactive protein (CRP) rate of different groups

Groups	Day-1 CRP (mg/dl) (MEAN±SD)	Day-7 CRP (mg/dl) (MEAN±SD)	Day-14 CRP (mg/dl) (MEAN±SD)	Day-28 CRP (mg/dl) (MEAN±SD)
Group-I	6.94±1.34	6.29±1.23	6.28±1.45	6.73±1.93
Group-II	19.23±0.04*	22.46±0.10*	26.34±0.19*	23.91±0.34*
Group-III	9.21±0.19* [#]	13.21±0.84* [#]	14.23±0.56* [#]	11.21±0.27* [#]
Group-IV	13.19±0.12* ^{#,§}	15.19±0.24* ^{#,§}	17.23±0.83* ^{#,§}	17.04±0.13* ^{#,§}
Group-V	9.22±0.78* ^{#,}	14.24±0.44* ^{#,}	15.26±0.23* ^{#,}	12.84±0.23* ^{#,}

(* $p < 0.05$ significant compared group-I with other groups, # $p < 0.05$ significant compared group-II with other groups, § $p < 0.05$ significant compared group-III with other groups, || $p < 0.05$ significant compared group-V with other groups)

Graph-1: Effect of aqueous extract of *Sesamum indicum* seeds on Rheumatoid arthritis factor of different groups



Discussion

RA is a debilitating, inflammatory and chronic disorder of joint can cause disability. Early diagnosis and interventions are required to prevent serious damage and loss of joint movements. Once person is conformed to RA need to implement best treatment protocol. It can help for better

outcome and reduce the progression of disease. Steroids are the major class of drugs used in the treatment of RA¹². In this study dexamethasone used as a standard drug which is produced better results compared to control group. Administration of dexamethasone suppresses the immune reactions and anti-body formation. The present study showed the significant reduction in ESR, CRP and RAF levels compared to other groups. Long term administration produced the better effect compared to control group. Girija P et.al., study showed dexamethasone administration significantly reduced the levels of inflammatory mediators¹³. The present study also showed the similar effects. *Sesamum indicum* seeds are commonly used to treat various conditions in remote areas. It was observed that administration of aqueous extract of *sesamum indicum* seed extract significantly prevented the Freund's complete adjuvant induced rheumatoid arthritis in Wistar Albino rats. High dose showed better effect compared to low dose. Previous studies done by Hemshekhar M et.al., proved that co-administration of *Sesamum indicum* seeds showed significant reduction FAC induced arthritis. Another study isolated the sesamin from the seeds of *Sesamum indicum* and screened for the anti-rheumatoid effect in rats. They were observed that rats received the sesamin showed the better effect compared to control group. It showed similar results like dexamethasone^{14,15}. Present study results also showed similar effect. High dose of seed extract showed better effect which is similar to dexamethasone. The study results proved that high dose of aqueous extract of *sesamum indicum* seeds are useful to prevent the disease progression with lesser side effects.

Conclusion

Aqueous extract of *Sesamum indicum* seeds showed significant protective effect in Freund's induced arthritis in Wistar Albino rats. High dose showed better results than low dose. In future more studies required on phytochemical analysis, identification of active molecule and its mechanism of action of *Sesamum indicum* seeds.

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