ejpmr, 2020,7(3), 361-363

SJIF Impact Factor 6.222

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

ISOLATION AND ANTI-INFLAMMATORY EFFECT OF *OSCILLATORIA ANNAE*

Pallavi K. Vawhal* and Shailaja B. Jadhav

Department of Pharmaceutical Chemistry, PES's Modern College of Pharmacy, Yamunanagar, Nigdi, Pune- 44. Maharashtra, India.

***Corresponding Author: Pallavi K. Vawhal**

Department of Pharmaceutical Chemistry, PES's Modern College of Pharmacy, Yamunanagar, Nigdi, Pune- 44. Maharashtra, India.

Article Received on 13/01/2020 **Article Revised on 03/02/2020** **Article Accepted on 24/02/2020**

ABSTRACT

Oscillatoria is a genus of filamentous cyanobacteria which is named for the oscillation in its movement. *Oscillatoria annae* are a morphologically diverse group of oxygenic photosynthetic prokaryotes, which are phylogenetically closed related to each other and to chloroplasts. *Oscillatoria annae* widely useful in agriculture, bioremediation, clinical diagnosis, pharmacological aspect etc. It is very important organism for the health and growth of many plants. Many of these produce enzymes with unique properties. The present study was undertaken to assess anti-inflammatory activities of its ethanolic extract. Anti-inflammatory activity was evaluated by carrageenan induced paw edema. Ethanolic extract of *Oscillatoria annae* (EEOA) was studied for the anti-inflammatory activity by in vivo albino rat models. Diclofenac sodium was employed as reference drugs for anti-inflammatory studies. In the present study, the ethanolic extract of *Oscillatoria annae* (EEOA) demonstrated significant anti-inflammatory activities in the tested models.

KEYWORDS: *Oscillatoria annae*, Ethanolic extract of *Oscillatoria annae*, Albino rats, Carrageenan, Paw edema.

INTRODUCTION

Inflammation is the response to injury of cells and body tissues through different factors such as infections, chemicals, and thermal and mechanical injuries.[1] Most of the anti-inflammatory drugs now available are potential inhibitors of cyclooxygenase (COX) pathway of arachidonic acid metabolism which produces prostaglandins. Prostaglandins are hyperalgesic, potent vasodilators and contribute to erythema, edema, and pain. Hence, for treating inflammatory diseases, analgesic and anti-inflammatory agents are required.[2] Nonsteroidal anti-inflammatory drugs (NSAIDs) are the most clinically important medicine used for the treatment of inflammation-related diseases like arthritis, asthma, and cardiovascular disease.[3] Nonsteroidal anti-inflammatory drugs (NSAIDs) are among the most widely used medications due to their efficacy for a wide range of pain and inflammatory conditions.[4] However, the long-term administration of NSAID may induce gastro-intestinal ulcers, bleeding, and renal disorders due to their nonselective inhibition of both constitutive (COX-1) and inducible (COX-2) isoforms of the cyclooxygenases enzymes.[5–7] Therefore, new anti-inflammatory and analgesic drugs lacking those effects are being searched all over the world as alternatives to NSAIDs and opiates.[8,9] Medicinal plants are believed to be an important source of new chemical substances with potential therapeutic effects.

Algae are a large and diverse group of simple, typically autotrophic organisms, ranging from unicellular to multicellular forms.[10] Cyanobacteria, also known as blue-green algae, blue green bacteria or Cyanophyta, are common members of the plankton of marine, brackish and freshwaters throughout the world. They also occur on rocks and soil and in symbiosis with plant and fungi. They have a simple structure at subcellular level and lack a nucleus, a characteristic feature defining them, along with bacteria, as prokaryotes.[11] Oscillatoria is a genus of filamentous cyanobacteria which is named for the oscillation in its movement. Filaments in the colonies can slide back and forth against each other until the whole mass is reoriented to its light source. It is commonly found in watering-troughs waters and is mainly blue-green or brown green. Oscillatoria is an organism that reproduces by fragmentation. Oscillatoria forms long filaments of cells which can break into fragments called hormogonia. The hormogonia can grow into a new, longer filament. *Oscillatoria annae* are a morphologically diverse group of oxygenic photosynthetic prokaryotes, which are phylogenetically closed related to each other and to chloroplasts. *Oscillatoria annae* include unicellular, colonial and filamentous forms some filamentous cyanophytes form differentiated cells called heterocyst, that are specialized for hydrogen fixation, and resting or spore cells called aconites. Most of the bacteria found in the fresh water, while others are marine occur in damp soil, or even temporarily moistened rocks in deserts.[12]

Furthermore, literature survey of *Oscillatoria annae* revealed that no researcher has yet reported in vivo and invitro anti-inflammatory activity of this alga. Therefore, it is worth investigating on the anti-inflammatory ethanolic extract of *O. annae* (EEOA).

MATERIALS AND METHODS

Preparation of Extract

About 50 g of powdered *Oscillatoria annae* was taken in a round bottom flask; 800 ml of ethanol was added and macerated for 7 days. During maceration the whole content was warmed two times a day at intervals. At the end of the 7 day the extract was filtered through muslin cloth while hot the extract was concentrated to a semisolid mass and dried in desiccators. This extract has been used for various experimental purposes.

Preparation of drug

Sodium metabisulphite, disodium edetate, carbacol were dissolved in water. Choke and swell it for 24hrs. Add benzyl alcohol and iso propyl alcohol, adjust the pH (7.2 – 7.8) using triethanolamine, add propylene glycol and *Oscillatoria annae* and mix well.

Acute Toxicity Studies

Acute toxicity studies were performed according to organization for economic cooperation and development (OECD/OCDE) guidelines. Male swiss mice selected by random sampling technique were employed in this study. The animals were fasted for 4hr with free access to water only. EEOA was administered orally at a dose of 5 mg/kg initially and mortality if any was observed for 3 days. If mortality was observed in two out of three animals, then the dose administered was considered as toxic dose. However, if the mortality was observed in only one animal out of three animals then the same dose was repeated to confirm the toxic effect. If no mortality was observed, then only higher (50, 300 and 2000 mg/kg) doses of EEOA were employed for further toxicity studies.

Anti-inflammatory activity

The Albino rats (100 – 150 mg) were divided into five groups. Group I was the control group received vehicle (1 ml / kg) orally, Group II was the toxin control received the carrageenan injection only, Group III and Group IV animals were treated with ethanolic extract of *Oscollatoria annae* at a dose of 200 mg/kg/day and 400 mg/kg/day respectively, topically and Group V animals were treated with diclofenac sodium, administered topically one hour before the sub plantar injection of 0.1 ml carrageenan (1% w/v) in the right paw of the rat. The thickness (mm) of the paw was measured immediately and the 2hr, 4hr, 6hr, 12hr after the administration of the carrageenan. A digital Vernier caliper (Model 206), Mututoyo dogmatic caliper, Japan was used for measuring paw thickness (mm) of rats.

Statistical analysis

Data obtained for each set of Anti-inflammatory models were expressed as means ± S.D and analyzed by one-way ANOVA followed by Dunnett's test. All statistical calculation were done using primer software and Graph Pad Prism (version 5.01) U.S.A statistical software. Level of significance was set at $P<0.05$, * $P<0.01$, ** $P<0.001$.

RESULT AND DISCUSSION

Table No. I: Effect of EEOA on Carrageenan Induced Rat Paw Edema.

Groups	0hr	1hr	2hr	4hr	6hr	12hr
Toxin control	0.89 + 0.18	1.86 + 0.14	2.59 + 0.08	3.08 + 0.11	2.91 + 0.17	2.52 + 0.27
Standard	0.68 + 0.23**	0.75 + 0.12**	2.37 + 0.33**	1.87 + 0.12**	1.36 + 0.17**	0.71 + 0.22**
EEOA (200mg/kg)	0.83 + 0.31	0.85 + 0.14*	2.41 + 0.31	2.12 + 0.12*	1.52 + 0.09*	0.87 + 0.09
EEOA (400mg/kg)	0.75 + 0.46	0.94 + 0.53	2.39 + 0.49	1.94 + 0.63	1.47 + 0.36	0.79 + 0.96

Values are expressed in mean + SD (n = 6) $P < 0.05$, *$P < 0.01$, **$P < 0.001$ vs. carrageenan by using one-way ANOVA followed by Dunnett's test.

CONCLUSIONS

Oscillatoria annae possess anti-inflammatory activity when studied in the rat paw edema induced by carrageenan. The pretreatment with EEOA showed significant reduction in the edema as compared to the diclofenac which is used as the standard.

ACKNOWLEDGMENTS

The authors are thankful to the Principal and Management, Nandha College of Pharmacy, Erode for providing the facility for carrying out the research work. This research did not receive any specific grant from funding agencies in the public, commercial, or not for profit sectors.

REFERENCES

1. O. A. Oyedapo, C. O. Adewunmi, E. O. Iwalewa, and V. O. Makanju. Analgesic, antioxidant and anti-inflammatory related activities of 21-hydroxy-2,41-dimethoxychalcone and 4-hydroxychalcone in mice. Journal of Biological Sciences, 2008; 8(1): 131-6.
2. M. Anilkumar, "Ethnomedicinal plants as anti-inflammatory and analgesic agents. Ethnomedicine: A Source of Complementary Therapeutics, Research Signpost, India, 2010; 267–93.
3. F. Conforti, S. Sosa, M. Marrelli. The protective ability of Mediterranean dietary plants against the oxidative damage: the role of radical oxygen species in inflammation and the polyphenol, flavonoid and sterol contents. Food Chemistry, 2009; 112(3): 587–94.

4. IMS Health, IMS National Sales Perspectives TM, 2005.
5. A. Robert. Antisecretory, antiulcer, cytoprotective and diarrheogenic properties of prostaglandins. Advances in Prostaglandin and Thromboxane Research, 1976; 2: 507–20.
6. B. M. Peska. On the synthesis of prostaglandins by human gastric mucosa and its modification by drugs. Biochimica et Biophysica Acta, 1977; 487(2): 307–14.
7. H. Tapiero, G. Nguyen Ba, P. Couvreur, K. D. Tew. Polyunsaturated fatty acids (PUFA) and eicosanoids in human health and pathologies. Biomedicine and Pharmacotherapy, 2002; 56(5): 215–22.
8. M. G. Dharmasiri, J. R. A. C. Jayakody, G. Galhena, S. S. P. Liyanage, and W. D. Ratnasooriya. Anti-inflammatory and analgesic activities of mature fresh leaves of Vitex negundo. Journal of Ethnopharmacology, 2003; 87(2-3): 199–206.
9. N. Kumara. Identification of strategies to improve research on medicinal plants used in Sri Lanka. Proceedings of the WHO Symposium, University of Ruhuna, Galle, Sri Lanka, 2001: 12–14.
10. The American Heritage Dictionary of the English Language. 4th ed., 2000.
11. Prescott, Harley, Klein: Microbiology. 4th ed., 1999; 441-48, 541-49, 839.
12. Rippka R., J. Deruelles, J.B. Waterbury, M. Herdman, R.Y. Stainer. Journal of General microbiology, 1979; 11: 1-61.