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Nerolidol: a potential approach in rheumatoid arthritis through reduction of TNF- α , IL-1 β , IL-6, NF-kB, COX-2 and antioxidant effect in CFA-induced arthritic model

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Abstract

Rheumatoid arthritis is primarily associated with inflammation and increased level of proinflammatory cytokines which are released by immune cells, macrophages or activation of arachidonic acid metabolism. The expression of these cytokines, oxidative free radicals and the activation of COX-2 enzymes are crucial targets for chronic inflammation. On the basis of established anti-inflammatory efficacy of nerolidol, the primary study was further appraised to determine its approach against Freund's complete adjuvant (CFA) rheumatoid model. Arthritis was induced by inoculation of 0.1 mL CFA injection into the left hind footpad of rats. Anti-arthritic potential of nerolidol (at 200, 400 and 800 mg/kg doses) was assessed by measuring the paw volume, body weight,

serum analysis, histopathological and radiographs of ankle joints. Expressions of cytokine's panels such as IL-10, IL-4, COX-2, NF-kB, TNF- α , IL-6, PGE-2 and IL-1 β were determined by real-time qPCR. Antioxidant enzyme analyses were conducted by measuring the SOD, POD and catalase activity from serum and equated with arthritic control group. Nerolidol prevented body weight loss, stabilized biochemical and haematological homeostasis and significantly reduced the paw volume. Furthermore, X-ray and histopathological assessment of ankle joints showed an improvement in the joint structure of rats treated with nerolidol. Besides that, overexpression of gene pointers like TNF- α , IL-1 β , IL-6, NF-kB, PGE-2 and COX-2 in CFA-treated control rats were also reversed with nerolidol. This anti-arthritic mechanism was further supported by the increased level of IL-10, IL-4 and serum antioxidant activity. The present findings demonstrate that nerolidol reduced adjuvant arthritis by downregulating the proinflammatory cytokines and upregulating the aforementioned anti-inflammatory cytokines and may be used as a therapeutic substance for the management of human rheumatoid arthritis.

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Availability of data and material

All the data of this study is transparent.

Code availability

Not applicable.

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Contributions

The study conceptualization was designed by HMI and A:
methodology and research work was developed by Miss SA:
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Ethics declarations

Conflict of interest

All authors declare that they do not have any known
competing interest.

Ethical approval

The experiments conducted on animals were performed according to animal ethics guidelines with approval NO. SU/Pharm/Animal Ethics Approval/2019/215.

Consent to participate

We, the authors, give consent as participants of this study.

Consent for publication

All the contributing authors provide consent for the publication of this study in your journal.

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