ORIGINAL RESEARCH

Comparison of Anti-Inflammatory Effect of Lansoprazole and Diclofenac Sodium: A Study in Male Albino Wistar Rats

Jagadish Chandrarao Narasaiah Lakkineni[1], Somnath Motgi[2]

ABSTRACT

Introduction: The experimental tissue injury caused by Carageenan, which is a widely used food additive, is a potent irritant in experimental animals resulted in a cascade of inflammatory events leading to the formation of exudates, induced by its biphasic nature. Nonsteroidal anti-inflammatory drugs (NSAIDs) and proton Pump Inhibitors (PPIs) are widely prescribed because of their efficacy in the management of pain, inflammation, and fever. This study compared the anti-inflammatory action of Lansoprazole and Diclofenac in Carageenan induced rats.

Materials and Methods: The study was conducted on 30 albino wistar rats which were divided into 3 groups of 10 each. Half hour before injecting Carrageenan, in control group (GroupA), 0.2 ml of normal saline is administered orally, 2.65mg/kg body weight Lansoprazole was administered into rats in Group B as a single dose and in Group C, rats were administered Diclofenac sodium 8.80 mg/kg body weight as a single dose.

Results: The mean volume of edema observed was highest in Group A as there was no anti inflammatory given. In the Group B, where in Lansoprazole was given has shown a mean edema of 0.3 mm. In group C the mean volume of edema was 0.2. The maximum inhibition was seen in Group C with Diclofenac (48%)whileLansoprazole (26%) had considerably lesser inhibition.

Conclusion: Our study showed that though Lansoprazole has a fairly good anti-inflammatory properties, it was not as good as Diclofenac. The mean inhibition of edema over time was much better by Diclofenac rather than Lansoprazole.

Keywords: Anti-inflammatory, Carrageenan, Lansoprazole Diclofenac, edema

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INTRODUCTION

Carageenan is a widely used in the food industry for their gelling, thickening, and stabilizing properties. Their main application is in dairy and meat products due to their strong binding to food proteins.[1] It has also been used as a laxative, as treatment for peptic ulcer disease, and as a component of pharmaceuticals, toothpaste, aerosol sprays, and other products.[2-5] Though it is a widely used food additive, especially in the western world, it is associated with induction and promotion of intestinal neoplasms and ulcerations in numerous animal experiments.[6] The experimental tissue injury caused by this irritant resulted in a cascade of inflammatory events leading to the formation of exudates, induced by its biphasic nature.

Inflammation is a protective response, designed to get rid of the source of infection as well as its consequence. It is a complex reaction in tissues that consists mainly of responses of blood vessels and leucocytes. Inflammation maybe acute, which lasts for a short time with exudation of fluid and edema, resulting in emigration of leucocytes predominantly neutrophils.[7] Sub acute infection lasts a little longer and results in healing of tissues. Chronic inflammation is much longer in duration and causes active inflammation, tissue destruction as well as healing of tissues.[8]

Nonsteroidal anti-inflammatory drugs (NSAIDs) are widely prescribed because of their efficacy in the management of pain, inflammation, and fever.[9]

Diclofenac was the first member of aryl acetic acid derivative and is a non-steroidal anti-inflammatory drug (NSAIDS). It is a nonselective inhibitor of cyclooxygenase-1 (COX-1) and cyclooxygenase-2 (COX-2) and helps in reducing fever, pain and inflammation. The mechanism of action is by inhibiting the production of prostaglandins.

Lansoprasol is a gastric pump inhibitor suppressing gastric acid secretions by specific inhibition of the hydrogen – potassium ATPase. It also had anti-inflammatory effect by inducing expression of heme-oxygenase-1.[10]

This study was conducted to compare the anti-inflammatory effectiveness of Lansoprasol with the standard drug, Diclofenac.

MATERIALS AND METHODS

This study was conducted in Department of Pharmacology, MNR Medical college and Mallareddy institute of Medical sciences during Aug-2014 to May 2015.30male albino rats weighing 250 – 300gms were selected for the study after obtaining acceptance from the animal ethical committee. All the rats were divided into 3 grouped with 10 rats each.

A mark is made at the ankle joint of each rat. Initial paw edema is measured before the beginning of the test by using a Plethsmograph

In control group (GroupA), 0.2 ml of normal saline is administered orally half hour before injecting Carrageenan. 2.65mg/kg body weight Lansoprazole is administered into rats in Group B as a single dose half hour before Carrageenan. In Group C, rats were administered Diclofenac sodium 8.80 mg/kg body weight as a single dose half hour before Carrageenan.

0.1ml of 1% suspension of Carrageenan is freshly prepared in normal saline and injected into the subplantar region of the left hind paw. The paw upto the ankle joint mark is measured in all the rats, before and 3 hours after the Carrageenan challenge, using a Plethsmograph filled with mercury.

The % of reduction in edema is calculated by the following formula;

$$\%\ \text{of reduction in edema} = \frac{\text{Mean edema in control group} - \text{mean edema in drug treated group}}{\text{Mean edema in control}} \times 100$$

The results were compared statistically by unpaired t test. $P<0.05$ was considered significant.

RESULTS

The mean volume of edema observed after 3 hours of exposure to Carrageenan was highest in Group A as there was no anti inflammatory given. In the Group B, where in Lansoprazole was given has shown a mean edema of 0.3 cm. In group C the mean volume of edema is 0.2cms. (Fig:1).

The efficacy of the drug is always measure by the amount of inhibition of edema that it can cause. The maximum inhibition was seen in Group C with Diclofenac and Lansoprazole had considerably lesser inhibition (Fig:2)

DISCUSSION

Of the methods available for the detection of anti-inflammatory drugs, one of the most useful methods is by measuring the inhibition of the edema produced because of 1% Carrageenan in rat hind paw.

It has been widely used as a simple and reliable model

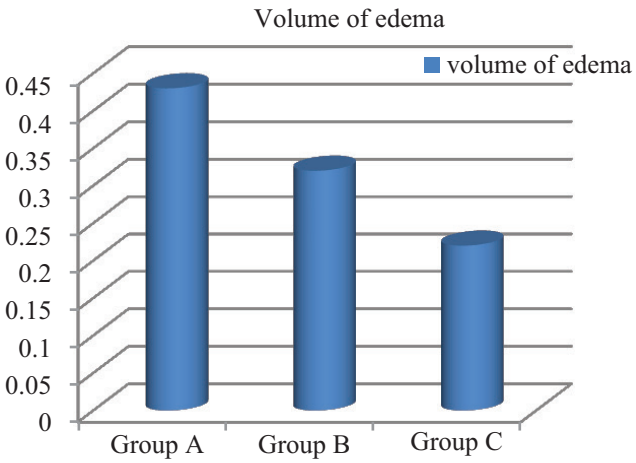

Figure-1: Mean volume of paw edema

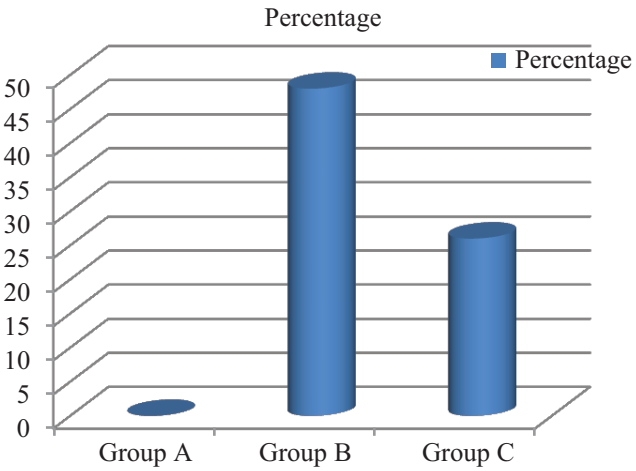

Figure-2: Percentage of edema inhibition

to assess anti-inflammatory activity of various agents. Also, inhibition of Carrageenan-induced inflammation has been shown to be highly predictive of anti-inflammatory drug activity in human inflammatory disease and doses of NSAIDs in this model correlate well with effective dose in patients.[11] In addition, this model allows to detect orally active anti-inflammatory agent particularly in acute phase of inflammation.[12]

The paw volume is measured before and after injection of Carrageenan and the paw volume of treated animals is compared to the controls (Group A). Any substance having ability to reduce paw volume in this model potentially acts as an anti-inflammatory agent by inhibiting synthesis of release of inflammatory mediators.

In our study, we have observed that the Group C, i.e. rats in which Diclofenac (8.80mg/kg body weight) had shown a better inhibition of rat hind paw edema (48%) as compared to Group B who were given Lansoprazole 2.65mg/kg body weight was given (26%).

In some other studies in humans, NSAIDS has been proven to be very effective in curing gastric and duodenal ulcers by Shiokawa et al in one of the first studies conducted in Japan(83.3%).[13] Similar results were seen in another study by Takayama et al[14], who found Diclofenac to considerably reduce inflammation of the rat's paw. In other study by Hawkey et al, proton Punp Inhibitor was found to be a very effective treatment for the duodenal ulcers(87.2%).[15] Agrawal et al found Lansoprazole to be 68.8% effective for treatment which was better than ranitidine.[16]

Our study did not include the analysis of pharmacokinetic parameters, but we observed that Diclofenac is delivered to the edematous site adequately and is able to exert the anti-inflammatory and analgesic effect. This was observed by other studies which had topical administration of diclofenac.[17-19]

CONCLUSION

This test was performed to find out the efficacy of Lansoprazole as compared to the standard method with that of Diclofenac. It is shown that though Lansoprasole had a fairly good anti-inflammatory properties, it was not as good as Diclofenac. The mean inhibition of edema over time was much better by Diclofenac rather than Lansoprozole. More such studies need to be done, probably by an increase in the dosage of Lansoprazole so as to get a better statistical analysis.

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