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EVALUATION OF THE ANTI-INFLAMMATORY ACTIVITY OF MANGIFERIN ON CARRAGEENAN-INDUCED INFLAMMATION

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ABSTRACT

Inflammation is a complex physiological response that plays a crucial role in the body's defense mechanisms but can also contribute to various pathological conditions when dysregulated. Mangiferin, a natural polyphenolic compound found in mango leaves and other plants, has shown promising anti-inflammatory properties in vitro and in some animal models. In this study, we aimed to evaluate the anti-inflammatory activity of mangiferin using a carrageenan-induced inflammation model in rats. Animals were divided into different treatment groups, including a control group, a positive control group receiving diclofenac, and experimental groups receiving varying doses of mangiferin. Paw edema and pain response were measured at different time points following carrageenan injection. Blood samples were collected for biochemical analysis of inflammatory markers. Our study design and methodology follow established protocols for evaluating anti-inflammatory agents in animal models. The findings from this study will contribute to our understanding of mangiferin's potential as a therapeutic agent for inflammatory disorders.

KEYWORDS: Mangiferin, inflammation, carrageenan, anti-inflammatory activity, rat model.

INTRODUCTION

Inflammation is a fundamental protective response of the body to injury, infection, or irritation. It involves a complex interplay of immune cells, cytokines, and mediators aimed at eliminating harmful stimuli and initiating tissue repair processes. However, chronic or excessive inflammation can lead to tissue damage and contribute to the pathogenesis of various diseases, including arthritis, atherosclerosis, and inflammatory bowel diseases.

Natural products derived from plants have long been recognized for their therapeutic potential in modulating inflammatory responses. Mangiferin, a glucosylxanthone found in several plant species, including mango leaves (Mangifera indica L.), has garnered attention due to its diverse pharmacological properties, including antioxidant, anti-diabetic, and anti-inflammatory effects. Several studies have reported the inhibitory effects of mangiferin on inflammatory mediators such as tumor necrosis factor-alpha (TNF-α), interleukin-6 (IL-6), and cyclooxygenase-2 (COX-2) in various experimental models.

Carrageenan-induced inflammation in rodents is a well-established model for evaluating the anti-inflammatory potential of drugs and natural compounds. Carrageenan, a polysaccharide derived from seaweeds, induces a localized inflammatory response characterized by edema, infiltration of inflammatory cells, and release of pro-inflammatory mediators. The model allows for the assessment of acute inflammatory processes and the screening of potential anti-inflammatory agents.

In this study, we aimed to investigate the anti-inflammatory activity of mangiferin using a carrageenan-induced inflammation model in rats. We hypothesized that mangiferin administration would attenuate paw edema and pain response in carrageenan-treated animals, possibly through the modulation of inflammatory mediators.

MATERIALS AND METHODS

Animals

Male Wistar rats weighing 180-220 g were obtained from [Institutional Animal Facility after approval from ccsea]. The animals were housed under standard laboratory conditions with ad libitum access to food and water and maintained on a 12-hour light-dark cycle.

Experimental Design
The animals were randomly divided into the following groups (n=6 per group)
Control group: Received vehicle (0.5% carboxymethyl cellulose) orally.
Positive control group: Received diclofenac (10 mg/kg) orally.
Experimental groups: Received mangiferin (doses: 25, 50, and 100 mg/kg) orally.

Induction of Inflammation
Inflammation was induced by subcutaneous injection of 0.1 mL of 1% carrageenan solution into the plantar region of the right hind paw of each rat, except for the control group, which received saline injection.

Administration of Test Samples
Mangiferin and diclofenac were administered orally using a gastric gavage needle immediately after carrageenan injection.

Measurement of Paw Edema
Paw volume was measured using a plethysmometer at 0, 1, 2, 3, and 4 hours post-carrageenan injection.

Assessment of Pain Response
Pain response was evaluated using the paw withdrawal latency (PWL) test at baseline and 4 hours post-carrageenan injection.

Biochemical Analysis
At the end of the experiment (4 hours post-carrageenan injection), blood samples were collected via cardiac puncture under anesthesia for the measurement of inflammatory markers (TNF-α, IL-6) using enzyme-linked immunosorbent assay (ELISA) kits.

Statistical Analysis
Data are expressed as mean ± standard error of mean (SEM). Statistical analysis was performed using one-way analysis of variance (ANOVA) followed by Tukey's post hoc test for multiple comparisons. A p-value < 0.05 was considered statistically significant.

RESULTS
The normal diameter of the paw measured by the caliper was found to be 6mm in normal or controlled group.

On encounter of inflammation the diameter get increased by 55 % that 9.3 mm.

On testing the experimental group the the diameter was found to be 7mm in 50 mg dose and 6 mm at a dose of 100mg. No difference were noted on the dose of 25 mg.

On comparing the experimental result with the standard one the study found that the diclofenac significantly decreased the swelled diameter and reads at 5mm.

The activity was assessed after 3 hr. from the administration of drugs.

Intitally at a control group the value of tnf-alpha was found to be 8.1pg/ml (picogram), in negative control group is it found to be 12 pg/ml and a experimental control group with a dose of 50 mg it was found to be 10 pg/ml and in a dose of 100 mg it is found to be 8 pg/ml.

DISCUSSION
This study helps in founding of the conclusion that mangiferin at a dose of 50 mg and 100 mg can be used as a replacement ingredient for the treatment of inflammation.

This can cab be used as a substitute for the non steroidal anti inflammatory drugs like diclofenac, ibuprofen, etc.

CONCLUSION
By Concluding the above stated result and discussion, this can be stated that the study projects the mangiferin as potent substitute of diclofenac and other Non steroidal anti inflammatory drugs, with a dose regiment of 50 mg and 100 mg, its natural origin also make it a choice for the substitution.

This conclusion is made on the basis of animal model by evaluating the animals in the parametric test like measurement of paw edema, level of tnf alpha in the blood.

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Conflict of Interest
The authors declare no conflicts of interest.

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