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Evaluation of Anti Infl Ammatory Activity of Fruits Extract of Sterculia Lychnophora

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ABSTRACT

Indian herbal therapy is assessed using the vast body of research on herbal plant species and their therapeutic principles conducted worldwide. In both conventional and modern medicine, medicinal plants that are shown to contain effective bioactive chemicals are used. For a variety of causes, a large proportion of patients experience rheumatoid arthritis with unknown inflammation. Therefore, the assessment of the anti-inflammatory properties of Sterculia lychnophora fruits is the focus of this study. The plant's fruits were gathered, removed, and put through both qualitative and quantitative testing. Additionally, the in vivo anti-inflammatory efficacy was examined in a model of paw edoema caused by carrageen. The results of the phytochemical testing indicated the presence of phenol, steroids, alkaloids, glycosides, tannins, and flavonoids. It was discovered that the total phenol and flavonoid content was, respectively, 0.857 mg/100 mg and 0.922 mg/100 mg. After 4 hours, the paw edoema in 100 mg/kg and 200 mg/mg was 2.75±0.32 & 1.23±0.20, respectively. When using the regular medication indomethacin, the paw edoema volume at the end of the fourth hour was 1.05±0.15. Therefore, it can be said that the extract's anti-inflammatory potential is almost as great as that of a prescription medication.

KEYWORDS:

Inflammation, Anti-inflammatory, Herbal medicine, Medicinal plants, Sterculia lychnophora. Carrageen induced paw edema

Introduction:

As a protective mechanism, inflammation induces a number of physiological changes that reduce tissue damage and get rid of harmful insult. It is anticipated that a number of illnesses, medical procedures, surgeries, and traumas would result in pain. Because pain is a complex experience with emotive, cognitive, and behavioral components that are all the result of mental processes, it is a representation of psychological conditions. Because of this, understanding the pathophysiological and psychological aspects of the phenomenon of pain is typically challenging. The word "suffering" is typically used in reference to pain. It

refers to a broad spectrum of intense and unpleasant subjective experiences that may have a medical or psychological basis, and it entails the conscious continuation of pain or discomfort. The International Association for the Study of Pain provides the most detailed and exhaustive definition of pain, which is "an unpleasant sensation and an emotional experience associated with a real or potential damage to tissue, or the equivalent of such damage" (Omoigui et al., 2007; Abramson and Weaver, 2005).

The inflammatory response is defined as the coordinated activation of signalling pathways that govern the levels of inflammatory mediators in resident tissue cells and inflammatory cells taken from the circulation. Inflammation is the root cause of many chronic illnesses, such as cancer, diabetes, gastrointestinal and cardiovascular disorders, and arthritis. While inflammatory response mechanisms vary depending on the type of initial stimulus and where it occurs in the body, they all follow a common basic mechanism that may be summed up as follows: Cell surface pattern receptors identify negative stimuli; inflammatory pathways are activated; inflammatory markers are generated; and inflammatory cells are drawn to the area (Chen et al., 2018; Pearlman, 1999).

Anti-inflammatory drugs aim to lessen tissue damage and improve patient comfort by interfering with the biology of inflammation. The two main groups of anti-inflammatory drugs are glucocorticoids and nonsteroidal anti-inflammatory drugs (NSAIDs). On the other hand, conventional NSAIDs suppress both types of COX and have negative side effects due to their non-selective action. Two COX isoforms are linked to different anti-inflammatory actions as well as unfavorable effects. Consequently, it is evident that a large number of chemicals produced from plants are included in the therapeutic toolkit of modern medicine. A multidisciplinary search for new leading compounds is fundamentally necessary for the successful development of novel naturally occurring anti-inflammatory drugs due to the vast array of species that are available for study (Vane and Botting, 1996; Bovill, 1997).

Traditional medicine has made extensive use of the matured, ripened, and dried seeds of Scaphium affine (Mast.) Pierre, which are known as Pangdahai (PDH) in Chinese and listed as Sterculia lychnophora Hance (scientific synonym) in the 2015 edition of the Chinese Pharmacopoea. Pharmacological studies on the polysaccharides and aqueous extracts of the plant have supported the use of these highly polar components, known as polysaccharides, in the traditional and ethnomedical treatment of constipation, pharyngitis, and pain. Additionally, although getting little attention, this study discovered that organic (ethanolic and methanolic) extracts of PDH exhibit a range of pharmacological effects, including anti-ulcer, anti-pyretic, anti-microbial, anti-obesity, and analgesic qualities (Oppong et al., 2018; El-Sherei et al., 2016). Therefore, the assessment of the anti-inflammatory properties of Sterculia lychnophora fruits is the focus of this study.

Materials & Methods:

Collection of Plant Materials:

In March 2023, the fruits of Sterculia lychnophora were harvested from the nearby Bhopal area, taking into account the seasonal conditions to produce the highest possible concentration of phytoconstituents.

Defatting and Extracting:

First, petroleum ether was applied to the plant material and left for 24 hours. For roughly 24 hours, the defatted plant was extracted using a solvent mixture of ethanol and water (ethanol: water; 70:30). The liquid extracts were collected in a tarred conical flask (Charlotte, 1993). The extract's solvent was extracted using a hot plate evaporation process.

Estimation of Total Phenolic Content:

The FC technique was used to estimate the total phenolic content. An aliquot of the extract was placed in a test tube and filled with distilled water to make a volume of one milliliter. Next, one milliliters of sodium carbonate solution and one milliliter of Folin-Ciocalteu reagent (1:1 with water) were added. Following mixing, the solution was allowed to sit at room temperature for ten minutes, during which the absorbance at 765 nm was measured in comparison to the reagent blank. Gallic acid was used to create a standard curve. The total phenolic content was determined using the standard curve and reported as the gallic acid equivalent in µg/mg of extract.

Estimation of Total Flavonoids Content:

The total flavonoid concentration in µg/mg of extract was calculated for each extract and expressed as the equivalent of quercetin. One milliliter (1 ml) of the standard quercetin solution (20, 40, 60, 80, and 100 mg/ml) was combined with one milliliter of 2% AlCl3. The mixture was allowed to sit at room temperature for fifteen minutes. Distilled water was added to get the volume up to 10 milliliters. After thoroughly mixing the solution, the absorbance at 420 nm was determined. It was determined what the total flavonoid content was using the standard curve.

Animals:

Wistar rats weighing between 150 and 200 grammes were kept in groups of six in controlled temperatures and humidity levels of 25±2 °C and 55–65% respectively, with a regular 12-hour light/dark cycle. Water was available at all times, along with conventional rat feed. Prior to doing the trials, the rats were given seven days to become used to the lab environment.

Grouping of Animals:

Group I was treated as control (0.1 ml of 1% (w/v) of was treated with carragenan (1%w/v) in saline in the subplanter region of the right hind paw),

Group II Carragenan+ fruits extract of Sterculia lychnophora -100 mg/kg.

Group III: Carragenan + fruits extract of Sterculia lychnophora -100 mg/kg.

Group IV: Carragenan + Indomethacin (10 mg/kg bw).

Rats were given 0.1 ml of a 1% carrageenan in saline injection into the subplantar area of their right hind paws in order to induce edoema. Using a plethysomgraph, the volumes of oedema in the injected and contralateral paws were assessed following the production of inflammation (Ambedkar et al., 2012).

Statistical Analysis:

Prism for Windows' graph pad was used for every analysis. The standard error of the mean (SEM) is represented as the mean ± in all statistical analyses. Data were compared with vehicle using Dunnett's test after one-way ANOVA analysis, where appropriate $p<0.05$ was deemed statistically significant.

Results & Discussion:

The results of the phytochemical testing showed the presence of phenol, steroids, alkaloids, glycosides, tannins, and flavonoids. It was discovered that the total phenol and flavonoid content was, respectively, 0.857 mg/100 mg and 0.922 mg/100 mg.

Additionally, measures of paw edoema were obtained at various intervals following drug administration, including 0 minutes, 30 minutes, 1 hour, 2 hours, and 4 hours. Plethysmometry was used to record the data. After 4 hours, the paw edoema in 100 mg/kg and 200 mg/mg was 2.75±0.32 & 1.23±0.20, respectively. When using the regular medication indomethacin, the pa edoema volume at the end of the fourth hour was 1.05±0.15. In the group of animals which are neither treated with plant extract nor with standard drug the paw edema volume got increased upto 5.15±0.14

Serotonin and histamine are released from mast cells during the first phase, which occurs one hour after the carrageenan challenge. Kinins supply the second phase, which occurs three hours later, and prostaglandins, cyclooxygenase products, and lipoxygenase products mediate the third phase, which occurs five hours later.

The existence of alkaloids 12 could explain the current action. Alkaloids may reduce the generation of interleukin 1 by human monocytes, the release of histamine by mast cells, the cytotoxicity of natural killer cells, and the proliferation of lymphocytes stimulated by antigens and mitogens.

Table 1: Estimation of total phenolic and flavonoids content of *Sterculia lychnophora*

Sr. No.	Hydroalcoholic extract	Total phenol content	Total flavonoids content
1.	*Sterculia lychnophora*	0.857 mg/100mg	0.922 mg/100mg

Table 7.6: Effect of extract of *Sterculia lychnophora* on paw edema induced by carrageenan in rats by different timelines

Groups	Dose (mg/kg)	0 hr	30 min	1 hr	2 hr	4 hr
Group-I	0.1 ml of 1% (w/v)	3.85±0.15	4.35±0.32	4.35±0.32	4.85±0.12	5.15±0.14
Group-II	100 mg/kg	2.60±0.20	2.65±0.14	2.65±0.14	2.85±0.15	2.75±0.32
Group-III	200 mg/mg	1.85±0.18	1.75±0.36	1.55±0.25	1.45±0.32	1.23±0.20
Group-IV	10 mg/kg	1.46±0.17	0.95±0.22	0.78±0.36	0.65±0.22	1.05±0.15

Values are expressed as mean ± SD.

*P < 0.05-significant compared to carragenan treated group.

Conclusion:

According to the current study, Sterculia lychnophora's herbal hydroalcoholic extract has a strong anti-nociceptive effect against oedema caused by carrageenan and may function by blocking inflammatory mediators including prostaglandins and bradykinin. The present investigation indicates that Sterculia lychnophora possesses potent anti-inflammatory properties; nonetheless, additional investigation into the active principle accountable for the pharmacological activity is necessary to get a comprehensive understanding of the medication. These strong ingredients can be combined to make a novel, robust anti-inflammatory mixture that helps treat acute inflammatory diseases.

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