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PHYTOCHEMICAL ANALYSIS AND ANTIINFLAMMATORY ACTIVITY OF *OPUNTIA FICUS-INDICA* SEED EXTRACT

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Abstract

This study focuses on the phytochemical analysis and anti-inflammatory properties of *Opuntia ficus-indica* seed extract. *Opuntia ficus-indica*, also referred to as nopal or prickly pear, has long been used for medical purposes. To detect and measure the bioactive substances in the seed extract, a thorough phytochemical analysis is part of the research. A range of spectroscopic and chromatographic methods are utilized to describe the extract's chemical makeup. A variety of phytoconstituents, including flavonoids, alkaloids, polyphenols, and tannins, are present, according to preliminary data. These substances are well-known for their pharmacological actions and possible health advantages. *Opuntia ficus-indica* seed extract's anti-inflammatory activity is evaluated using in vitro method. Enzymes and cytokines are examples of inflammatory markers that are examined in order to assess how well the extract reduces inflammatory reactions. The extract may have use as a natural treatment for inflammatory disorders, as the results show a noteworthy anti-inflammatory impact.

Keywords: *Opuntia ficus-indica*, flavonoids, alkaloids, polyphenols, cytokines.

1 Introduction

In recent years, there has been a growing interest in the therapeutic potential of natural products, which has led to research into different botanical sources for their bioactive components. Of them, *Opuntia ficus-indica,* also referred to as nopal or prickly pear, has shown great promise because of its extensive historical usage in traditional medicine (Basu *et al*.,2014). To understand the chemical makeup and therapeutic potential of *Opuntia ficus indica* seed extract, this study explores its anti-inflammatory qualities and phytochemical analysis. Cactaceae member *Opuntia ficus-indica* has been grown for millennia in both culinary and medicinal contexts and is well known for its hardiness in desert climates. *Opuntia ficus-indica* seeds, which are frequently disregarded, may contain bioactive substances with a variety of pharmacological effects. The current study conducts a thorough phytochemical examination of these seeds to identify and measure the variety of phytoconstituents present. *Opuntia ficus-indica* seed extract exhibits a wide variety of secondary metabolites, including flavonoids, alkaloids, polyphenols, and tannins, according to the preliminary phytochemical screening.

These substances are well known for having antibacterial, anti-inflammatory, and antioxidant qualities, which suggests the extract has a variety of medicinal uses. The foundation for comprehending the possible health advantages of consuming *Opuntia ficus-indica* seeds has been established by the discovery and quantification of these phytochemicals (Gebreselema *et al.,* 2013). When dysregulated, inflammation, a basic physiological reaction to damage or infection, is linked to several chronic illnesses.The main goal of this study is to evaluate the anti-inflammatory properties of *Opuntia ficus-indica* seed extract. In vitro tests evaluate the extract's capacity to alter important inflammatory indicators. It has potential for therapeutic use (V. Defraine *et al*., 2018).

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2. MATERIALS METHOD

2.1 Collection of plant material

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Fresh fruit of *Opuntia ficus indica* was collected from a dry place. The seed was cleaned properly and shadow dried. After complete drying, the seed was separated and powdered. It was stored in an airtight container.

2.2 Extraction of seed

A mixture of 250 ml distilled water, ethanol, and 25 grams of finely powdered seed was used. After that, the suspension is allowed to incubate for 48 hours, or roughly two days, with periodic shaking. The contents are filtered via Whatman No. 1 filter paper following a 48-hour incubation period. The filtrate was then subjected to analysis.

2.3 Qualitative Phytochemical analysis

The plant extract was tested for detecting various Phytochemicals present in the *Opuntia ficus indica* seed extract using the standard procedure prescribed by (Harborne, 1998); (kokate et al., 2002).

2.3.1) Test for carbohydrates

a)Molish's test

Plant extract was treated with a few drops of Alpha naphthol, and concentrated sulphuric acid added to the mixture in a slanting position. Observance of violet color ring indicates the presence of carbohydrates.

b) Benedict's test

0.5 ml of extract was treated with 0.5 ml of Benedict's reagent and kept in a water bath for 2 minutes. Formation of precipitates indicates the presence of carbohydrates

2.3.2 Test for tannins

a) Ferric chloride test

A small quantity of extract was mixed with water and heated in a water bath. The mixture was filtered and 5% of ferric chloride was added to the filtrate. A dark green color was formed. It indicates the presence of tannins.

b) Lead acetate test

3 ml of 10% lead acetate was added to the sample solution. Formation of bulky white precipitate indicates the presence of tannins.

2.3.3 Test for saponins

2 ml of distilled water was added with the sample solution and shakes well. The formation of foams indicates the presence of saponins.

2.3.4 Test for alkaloids

a) Mayer's test

The sample solution is treated with 2 drops of Mayer's reagent. The formation of white creamy precipitate indicates the presence of alkaloids.

b) Wagner's test

A few drops of Wagner's reagent were added to the sample. The formation of reddish-brown precipitate indicates the presence of alkaloids.

2.3.5 Test for Flavonoids

The sample solution is treated with 1 ml of 2N sodium hydroxide. The formation of yellow colour indicates the presence of flavonoids.

2.3.6) Test for glycosides

The sample solution is treated with 3 ml of chloroform and 10% ammonia. The formation of pink colour indicates the presence of glycosides.

2.3.7 Test for quinones

1 ml of concentrated sulphuric acid is added to the sample in slanting position. The formation of red colour indicates the presence of quinones.

2.3.8) Test for Phenols

The sample solution is treated with a few drops of 10% ferric chloride. Formation of blue or green colour indicates the presence of phenols.

2.3.9) Test for terpenoids

The sample solution is added with 2 ml of chloroform and treated with concentrated Sulphuric acid. The formation of red brown colour indicates the presence of terpenoids.

2.3.10) Test for steroids

A few drops of concentrated sulphuric acid are added to the sample solution in a slanting position. The occurrence of brown ring indicates the presence of steroids.

2.4. Anti-inflammatory activity by Egg albumin denaturation assay

Inhibition of egg albumin denaturation was determined using the method prescribed by Chandra et al., (2012); Sangeetha et al., (2011).

To prepare phosphate buffer saline (pH 6.4) 8 g of sodium chloride (NaCl), 0.2 g of potassium chloride (KCl), 1.44 g of disodium hydrogen phosphate (Na2HPO4), and 0.24 g of potassium dihydrogen phosphate (KH2PO4) were dissolved in 800 ml of distilled water. The pH was adjusted to 6.4 using 1N hydrochloric acid (HCl) and made the volume to 1000 ml with distilled water.

Control solution (5 ml): 0.2 ml of egg albumin (from fresh hen's egg), 2.8 ml of phosphate buffer saline (pH 6.4), and 2 ml of distilled water.

Standard solution (5 ml): 0.2 ml of egg albumin, 2.8 ml of phosphate buffer saline, and 2 ml of various concentrations of the standard drug diclofenac sodium (100-500 µg/ml)

Test solution (5 ml): 0.2 ml of egg albumin, 2.8 ml of phosphate buffer, and 2 ml of various concentrations of test samples (100-500 µg/ml).

Procedure

2.8 ml of phosphate buffer saline (pH 6.4) and 0.2ml of egg albumin were incubated with various concentrations (100,200,300,400 and 500 µg/ml) of test samples and standard drug diclofenac sodium (100,200,300,400 and 500 µg/ml) then the samples were incubated at 37°C for 15 minutes and heated at 70°C for 5 minutes. After cooling, the absorbance of the above solutions was measured using ultraviolet visible spectrophotometer at 660 nm. The percentage inhibition of protein denaturation was calculated using the following formula.

Percentage inhibition = (Abs control – Abs sample)/ Abs control × 100

3. RESULTS

3.1 PHYTOCHEMICAL ANALYSIS OF AQUEOUS EXTRACT OF *Opuntia Ficus indica* SEED EXTRACT

A qualitative phytochemical study was performed on the crude extract of the aqueous extract of *Opuntia ficus indica* seed extract to detect several phytochemicals, such as quinones, phenols, terpenoids, alkaloids, tannins, saponins, and carbohydrates. The results are shown in Table 1. The aqueous extract contains several phytochemicals, including alkaloids, flavonoids, glycosides, quinones, tannins, saponins, polysaccharides, and steroids.

Table 1: PHYTOCHEMICAL ANALYSIS OF AQUEOUS EXTRACT OF *OPUNTIA FICUS INDICA* SEED EXTRACT

S. NO	PHYTOCHEMICALS	AQUEOUS EXTRACT
1	Carbohydrates	+
2	Tannins	+
3	Saponins	+
4	Alkaloids	+
5	Flavonoids	+
6	Glycosides	+
7	Quinones	+
8	Phenols	-
9	Terpenoids	+
10	Steroids	+

SEED EXTRACT

FIG: 1 QUALITATIVE PHYTOCHEMICAL ANALYSIS OF *OPUNTIA FICUS INDICA* SEED EXTRACT

3.2 ANTI-INFLAMMATORY ACTIVITY

The egg albumin denaturation assay was used to evaluate the anti-inflammatory properties of *Opuntia ficus indica* seed extract. A good degree of anti-inflammatory activity is shown by the different quantities of *Opuntia ficus indica* seed extract (100, 200, 300, 400, and 500 µg/mL). The *Opuntia ficus indica* seed extracts more anti-inflammatory action in the majority of concentrations. The typical anti-inflammatory medication, diclofenac sodium, has roughly the same anti-inflammatory action as *Opuntia ficus indica* seed extract.

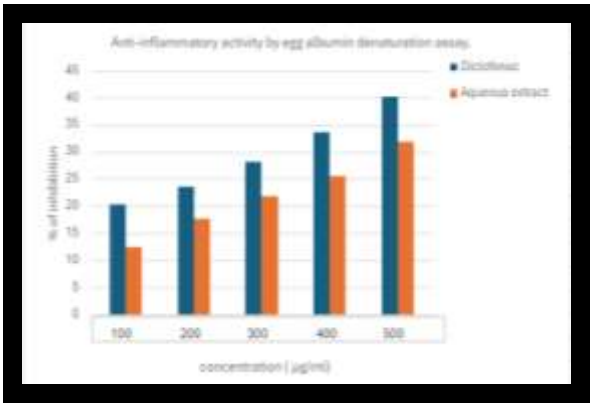

FIG: 2 ANTI-INFLAMMATORY ACTIVITY OF *OPUNTIA FICUS INDICA* SEED EXTRACT

4. CONCLUSION

The presence of various Phytochemicals and biochemical activities such as anti-inflammatory activity of the opuntia ficus indica seed extract has been proved based on the results obtained through in vitro studies. The seed extract of *Opuntia ficus indica*

has many phytochemicals. The anti-inflammatory activity can prove that the opuntia ficus indica seed extract has the potential to act against inflammation. This research can help to create a novel drug against inflammation.

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Conflict of interest

The authors declare no conflict of interest, financial or otherwise.

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