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Anti Inflammatory Activity of Mangifera Indica Peel – In Vitro Study

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ABSTRACT

Mangifera indica is ordinarily useful herb in ayurveda. This paper is study the phytochemical and pharmacological activities of the herb. Various reports indicate antidiabetic, anti-oxidant, anti-viral, cardiotonic, hypotensive, and anti-inflammatory properties. In addition, the other properties like antibacterial, antipyretic, antidiarrhoeal, antiallergic, immunomodulation, anti microbial, hepatoprotective, and gastroprotective have been investigated. The aim of the study is to find the Invitro anti-inflammatory activity of magnifera Indica peels using a protein denaturation assay. The results indicate the protein denaturation is the cause of inflammation and the herb possesses different potent healthful effects.

Keywords: *mangifera indica,* antiinflamatory, peel, antioxidant, mango

Introduction

Mangifera indica (MI) has been an important herb in the Ayurveda and native medicine for more than four thousand years. Mangoes lie in the genus Mangifera consisting of over thirty taxonomic tropic fruit trees in the plant family Anacardiaceae.

Different parts of MI exhibits multi - medicinal properties as per Ayurvedic medicine(Scartezzini P, Speroni E 2000). It is a polyphenolic antioxidant with anti lipid peroxidation, immunomodulator, hypotensive and antidiabetic properties.
Several components of MI are utilized as a disinfectant, hemostatic, sudorific, anthelmintic, purgative and also used in the medical management of looseness of the bowels, infectious disease, blood disorder, respiratory illness, high blood pressure, sleep disorder, autoimmune disease, odontalgia, bleeding and hemorrhoids.(Khan MN et al., 2000). It is also used in the treatment of abscesses, animal bite, neoplasm, toxic condition, spontaneous abortion, zoonotic disease, vesicle and hepatic disease disorders(Khan MN et al., a 1993).

The seed kernel of MI exhibits evidential anti-inflammatory property in acute and chronic inflammation.(Shankarnarayanan D et al., 1979 Khan MA, Khan MN b 1989). The leaf extract of MI also displays antibacterial and analgesic properties. (Ross 1999). All the properties were found due to the presence of polyphenols in the extract. Anti-inflammatory property of MI extracts were studied by topical injection of 0.5-2 mg of MI extract in the ear of mice.(Subbarayan C, Cama HR 1966, Seifried HE et al., 2007). The topical administration of MI extract decreased ear swelling evoked by arachidonic acid and phorbol myristate in rat. (Diplock AT et al.,1998, Maxwell SR 1997). The anti-inflammatory and anti-nociceptive activities of MI extract are evident from the study results conducted on rat.(Martinez G et al.,2007, Pardo-Andreu GL et al., 2006, Rocha Ribeiro SM et al., 2007).

MI is a giant coniferous woody plant in the Anacardiaceae family with a height of about 46 meters, concave-shaped and heavily bifurcate from a sturdy tree trunk. The leaf blades are almost 26-cm long and 8-cm broader, and spirally arranged leaves produce an aroma when crushed. There are about 4000 tiny yellowish-green flowers. When ripened, the fruit shows a greater variation in form and size with a yellow pulp, solitary seed, and yellowish red skin. The various chemical substance of MI includes the polyphenols, flavonoids, gallic acid, tannins & derivatives.

Antioxidant and antiproliferative activity

The oxidative impairment evoked by hydrogen peroxide in a human hepatoma cell, HepG2 were reversed by the cytoprotective phenomenon of mango pulp and skin extracts and the fundamental chemical process was determined by a single-cell electrophoresis assay. DNA damage was inhibited by the management of HepG2 cell with MI skin extract. Eectron spin resonance (ESR) was used to evaluate the free radical scavenging properties of MI pulp and skin extracts. The mango skin possesses powerful free radical scavenging quality on diphenyl picrylhydrazyl and alkyl radicals than mango pulp, irrespective of maturity.(Shibahara A,et al.,1993, Nunez Selles AJ et al.,2002, Andreas Set al.,2007). Skin extract displayed a significant antiproliferative effect against cancer cells than flesh extract attributed to phenolic and flavonoid.(Pott Iet al., 2003). The results showed the skin extract poetesses great antioxidant activity and anticancer properties(Chen JP et al., 2004).

Mango, an important tropical fruits is processed for various products during which the skin is often being wasted. The bioactive conserves extracted from raw and ripe mango skin using 80% acetone were subjected to acid hydrolysis. Gallic acid, syringic acid, mangiferin, ellagic acid, gentisyl-protocatechuic acid, quercetin were the phenolic compounds identified in both raw and ripe peels. In addition to this, glycosylated iriflophenone and maclurin derivatives were also seen in raw peel. β-Carotene and lutein were the major carotenoids. Thus, raw and ripe mango peel extracts have different phenolic compounds and carotenoids with various pharmaceutical applications.

Polyphenoloxidase from MI skin was refined to homogeneity by ammonium sulphate fractionation, chromatography on DEAE-Sephadex and gel filtration of Sephadex G-200. The enzyme had an apparent molecular weight of 136,000. Its pH and temperature optimum were 5.4 and 50‡C, respectively. Mango skin polyphenol oxidase, when immobilized onto DEAE Sephadex showed slightly higher Km for catechol and lower pH and temperature optima.

Materials and Method

protein denaturation inhibition assay. Inflammation is caused by protein denaturationand therefore it can be used for *in vitro* screening. Test extract at various concentrations with 1% aqueous solution of bovine albumin is the reaction mixture, the pH adjusted using 1N hydrochloric acid.

The samples were incubated at 37^{o}C for 20 min and heated at 57^{o}C for 20 min. The turbidity was measured spectrophotometrically at 660nm after cooling the samples.[10, 11]

Percentage inhibition of protein denaturation was determined using the formula:

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

Results

The documented reason of inflammation is protein denaturation. As a part of the research on the mechanism of anti-inflammatory property, the quality of the extract to inhibit protein denaturation was also investigated. It was efficient in decreasing heat-induced albumin denaturation at various concentrations, as shown in table 1 Maximum inhibition 71.93±1.117% was observed at 500µg/ml. IC50 value was found to be 119.35±1.99µg/ml Aspirin, a standard anti-inflammatory drug showed the maximum inhibition, 77.12±1.42% at the concentration of 200µg/ml (Table 1).

Table 1 :Protein denaturation Inhibitng activity of methanolic extract

Sample concentration (µg)	Percentage activity %	Control (Aspirin) Concentration(µg)	Percentage activity %
100	7.42 ± 0.89	50	17.97±0.50
200	19.23 ± 1.79	100	32.68±0.57
300	35.25 ± 1.22	150	47.39±1.50
400	52.53 ± 1.22	200	63.07±1.49
500	72.93 ± 1.117	250	77.12±1.42
Ic_{50} (µg/ml)	102.35±1.99	Ic_{50} (µg/ml)	39.78±0.50

Discussion

The seed kernel of MI exhibits evidentiary anti-inflammatory activity in acute and chronic inflammation. (Muruganandan S et al.,2003, Desai PDet al.,1996) The leaf extract of MI also displays antibacterial and analgesic properties. All the properties were found due to the presence of polyphenols in the extract. *Mangifera indica* is an essential source of many pharmacologically and medicinally important chemicals such as mangiferin, polyphenols and carotenes. (Knödler Met al., 2007, Ornelas-Paz Jde J et al., 2007, Subha R et al.,2007). Many different pharmacological activities, antioxidant, radioprotective, immunomodulatory, anti-

allergic, antidiabetic, lipolytic, monoamine oxidase-inhibiting and antimicrobial have been reported for mangiferin. A defined mixture of components like polyphenols, terpenoids, steroids, fatty acids, and microelements is present in VIMANG, an extract from the stem bark of *M. indica*. In order to study whether the extract contributes to this mechanism of anti-inflammatory activity, inhibitory effects of *M. indica* are bestowed in this work on in vitro eicosanoid-releasing systems. (Gabino G et al., 2008, Pardo Andreu Get al.,2005, Sanchez GMet al.,2000).

Conclusion

This study reveals that *Mangnifera indica* has varied pharmacological activities and alsoan essential source of pharmacologically and medicinally powerful chemicals such as mangiferin, polyphenols and carotenes. Due to its various activities and therapeutic use of mangiferin, it has been used with success in Ayurveda for many years .

Author contribution

Bhaskaran Sathyapriya conceived of the presented idea. Jayesh S Raghavendra, Swamikannu Bhuminathan Adugula Chandrakala, Kesavaram Padmavathy, Bharathwaj D K and Indhumathi Krishnaswamy ,encouraged and supervised the findings of this work. All authors discussed the results and contributed to the final manuscript.

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Conflict of interest. Nil

Study significance. The study finds out In vitro anti-inflammatory activity of *Magnifera indica* peels using protein denaturation assay.

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