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Anti inflammatory Activity of MangiferaIndica Peel

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Abstract

Introduction

Mangiferaindica, commonly used herb in ayurvedic medicine. Although review articles on this plant are already published, but this review article is presented to compile all the updated information on its phytochemical and pharmacological activities, which were performed widely by different methods. Studies indicate mango possesses antidiabetic, anti-oxidant, anti-viral, cardiotonic, hypotensive, anti-inflammatory properties.

Aim: *The aim of the study is to find the Invitroantiinflamtory activity of magniferaIndica peels* ***Method :*** *The reaction mixture consisted of test extract at different concentrations and 1% aqueous solution of bovine albumin fraction. pH of the reaction mixture was adjusted using small amount of 1N HCl. The samples were incubated at 37oC for 20 min and then heated at 57oC for 20 min. After cooling the samples, the turbidity was measured spectrophotometrically at 660 nm. The experiment was performed in triplicate*

Result

Denaturation of proteins is a well-documented cause of inflammation. As a part of the investigation on the mechanism of the anti-inflammatory activity, ability of extract to inhibit protein denaturation was studied.

Keywords:*mangiferaindica, antiinflamatory, peel,antioxidant,mango*

I. Introduction

Mangiferaindica (MI), also known as mango, it has been an important herb in the Ayurvedic and indigenous medical systems for over 4000 years. Mangoes belong to genus Mangifera which consists of about 30 species of tropical fruiting trees in the flowering plant family Anacardiaceae. According to ayurveda, varied

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medicinal properties are attributed to different parts[1] Mango is one of the most popular of all tropical fruits. Mangiferin, being a polyphenolic antioxidant and a glucosylxanthone, it has strong antioxidant, anti lipid peroxidation, immunomodulation, cardiotonic, hypotensive, wound healing, antidegenerative and antidiabetic activities.

Various parts of plant are used as a dentrifrice, antiseptic, astringent, diaphoretic, stomachic, vermifuge, tonic, laxative and diuretic and to treat diarrhea, dysentery, anaemia, asthma, bronchitis, cough, hypertension, insomnia, rheumatism, toothache, leucorrhoea, haemorrhage and piles.[2] All parts are used to treat abscesses, broken horn, rabid dog or jackal bite, tumour, snakebite, stings, datura poisoning, heat stroke, miscarriage, anthrax, blisters, wounds in the mouth, tympanitis, colic, diarrhea, glossitis, indigestion, bacillosis, bloody dysentery, liver disorders, excessive urination, tetanus and asthma.[3]

Anti-inflammatory

An ethanolic (95%) extract of the seed kernel of MI exhibited significant anti-inflammatory activity in acute, subacute and chronic cases of inflammation. (5)The MI leaf extract exhibited antibacterial activity against Bacillus subtilis, staphylococcus albus and Vibrio cholerae.(6)Analgesic and anti-inflammatory effects of MI extract (Vimang) has studied. The polyphenols found in the extract were found to account for the activity reported In vivo and in vitro anti-inflammatory activity of MI extracts (VIMANG) was investigated. MI extract, administered topically (0.5-2 mg per ear), reduced ear edema induced by arachidonic acid (AA) and phorbolmyristate acetate (PMA, ED50 = 1.1 mg per ear) in mice.(3) The results represent an important contribution to the elucidation of the mechanism involved in the anti-inflammatory and anti-nociceptive effects reported by the standard MI extract VIMANG.[4]

Description

MI is a large evergreen tree in the anacardiaceae family that grows to a height of 10-45 m, dome shaped with dense foliage, typically heavy branched from a stout trunk. The leaves are spirally arranged on branches, linear-oblong, lanceolate – elliptical, pointed at both ends, the leaf blades mostly about 25-cm long and 8-cm wide, sometimes much larger, reddish and thinly flaccid when first formed and release an aromatic odour when crushed. The inflorescence occurs in panicles consisting of about 3000 tiny whitish-red or yellowish – green flowers. The fruit is a well known large drupe, but shows a great variation in shape and size. It contains a thick yellow pulp, single seed and thick yellowish – red skin when ripe. The seed is solitary, ovoid or oblong, encased in a hard, compressed fibrous endocarp. Chemical constituents of MI are always of an interest. The different chemical constituents of the plant, especially the polyphenolics, flavonoids, triterpenoids. Mangiferin a xanthone glycoside major bio-active constituent, isomangiferin, tannins &gallic acid derivatives [5]

Antioxidant and anti proliferative activity

The antioxidant and antiproliferative properties of flesh and peel of mango (Mangiferaindica L.) were investigated. The cytoprotective effect of mango flesh and peel extracts on oxidative damage induced by H2O2 in a human hepatoma cell line, HepG2, were determined, and the underlying mechanism was examined by a single-cell electrophoresis assay (comet assay). Treatment of HepG2 cell with mango peel extract prior to oxidative stress was found to inhibit DNA damage. The free radical scavenging activities of mango flesh and peel extracts were evaluated by electron spin resonance (ESR). The mango peel extract exhibited stronger free

radical scavenging ability on 1,1-diphenyl-2-picrylhydrazyl (DPPH) and alkyl radicals than mango flesh extract, regardless of ripeness. (9)Similarly, peel extract exhibited significant antiproliferative effect against all tested cancer cell lines, compared to that of flesh extract, in a dose-dependent manner.(10) The result also showed that the antiproliferative activity of mango flesh and peel extracts correlated with their phenolic and flavonoid contents. Thus, mango peel, a major by-product obtained during the processing of mango product, exhibited good antioxidant activity and may serve as a potential source of phenolics with anticancer activity.[6]

Characterization of bioactive compounds from raw and ripe Mangiferaindica peel extracts

Mango is one of the important tropical fruits in the world. As it is a seasonal fruit, it is processed for various products. During its processing, peel is one of the major byproducts, which is being wasted. Bioactive conserves were extracted using 80% acetone from peels of raw and ripe mango fruits and subjected to acid hydrolysis.[7]The prominent phenolic compounds identified by HPLC were protocatechuic acid, gentisic acid and gallic acid. The phenolic acid derivatives present in acetone extracts of raw and ripe peels were tentatively identified by LC–MS. Gallic acid, syringic acid, mangiferin, ellagic acid, gentisyl-protocatechuic acid, quercetin were the phenolic compounds identified in both raw and ripe peels, while raw peel showed the presence of glycosylated iriflophenone and maclurin derivatives also. β-Carotene was the major carotenoid followed by violaxanthin and lutein. Thus, both raw and ripe mango peel extracts have different phenolic compounds and carotenoids, which will have various pharmaceutical applications.[8]

Purification and properties of polyphenoloxidase of mango peel (Mangiferaindica)

Polyphenoloxidase from mango(Mangiferaindica) peel was purified 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. (13)The enzyme possessed catecholase activity and was specific too-dihydroxy phenols. The enzyme also exhibited peroxidase activity. Some non-oxidizable phenolic compounds inhibited the enzyme competitively. High inhibitory effects were also shown by some metal chelators and reducing agents, Mango peel polyphenol oxidase when immobilized onto DEAE Sephadex showed slightly higher Km for catechol and lower pH and temperature optima.[9]

II. Methodology:

Inhibition of protein denaturation:

The denaturation of proteins is one of the cause of inflammation. Hence, protein denaturation can be employed as *in vitro* screening model for anti-inflammatory compounds. The reaction mixture consists of test extract at different concentrations and 1% aqueous solution of bovine albumin fraction. pH of the reaction mixture was adjusted using small amount of 1N HCl. The samples were incubated at 37oC for 20 min and then heated at 57oC for 20 min. After cooling the samples, the turbidity was measured spectrophotometrically at 660 nm. The experiment was performed in triplicate.[10] [11]

Percent inhibition of protein denaturation was calculated as follows:

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

III. Result

Denaturation of proteins is a well- documented cause of inflammation. As a part of the investigation on the mechanism of the anti-inflammatory activity, ability of extract to inhibit protein denaturation was studied. It was effective in inhibiting heat induced albumin denaturation at different 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 :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

IV. Discussion

An ethanolic (95%) extract of the seed kernel exhibited significant antiinflammatory activity in acute, subacute and chronic cases of inflammation[12]. The leaf extract exhibited antibacterial activity against Bacillus subtilis, staphylococcus albus and vibrio cholera.Analgesic and anti-inflammatory effects also has been studied[13]. The polyphenols found in the extract were found to account for the activity reported.The results represent an important contribution to the elucidation of the mechanism involved in the anti-inflammatory and anti-nociceptive effects reported by the standard MI extract[14]. Mangiferaindica is an important source of many pharmacologically and medicinally important chemicals such as mangiferin, mangiferonic acid, hydroxymangiferin, polyphenols and carotenes. Many different pharmacological activities, antioxidant, radioprotective, immunomodulatory, anti-allergic, antiinflammatory, antitumor, antidiabetic, lipolytic, antibone

resorption, monoamine oxidase-inhibiting, antimicrobial and antiparasitic, have been reported for mangiferin. VIMANG is an extract obtained from the stem bark of selected varieties of M. indica and contains a defined mixture of components: polyphenols, terpenoids, steroids, fatty acids and microelements .Mangiferin has been tested in vitro for its antioxidant , immuno-stimulating and anti-viral properties. pathway in an acute treatment[15]. The inhibitory effects of M. indica are presented in this study on in vitro eicosanoid-releasing systems to investigate whether the extract contributes to this mechanism of anti-inflammatory activity. Many different studies have suggested that macrophages are a potent source of AA metabolites generated via COX and LOX pathways.[16][17][18]

V. Conclusion

This study reveals that Mangniferaindica is an important source of many pharmacologically and medicinally important chemicals such as mangiferin, mangiferonicacid ,hydroxymangiferin, polyphenols and carotenes[19][20]. Many different pharmacological activities, antioxidant, radioprotective, immunomodulatory, anti-allergic, anti-inflammatory, antitumor, antidiabetic, lipolytic, antibone resorption, monoamine oxidase-inhibiting, antimicrobial and antiparasitic, have been reported for mangiferin.[21] Based on the knowledge of the many properties of mangiferin, phytomedicines should be adequately standardized regarding this active compound. MI has been used successfully in Ayurvedic medicine for centuries, more clinical trials should be conducted to support its therapeutic use.[23][24][25]

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