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Pharmacological effects of *Saccharum officinarum L.*

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ABSTRACT

Saccharum officinarum L. sugarcane, is a large, strong-growing species of grass in the genus Saccharum. It originated in Southeast Asia and is now cultivated in tropical and subtropical countries worldwide for the production of sugar and other products. S. Officinarum, a perennial plant, grows in clumps consisting of a number of strong unbranched stems..The aim of this study is to overview its therapeutic effects than its nutritive and industrial effects. This review article was carried out by searching studies in PubMed, Medline, , Web of Science, and Iran Medex databases up to 2016.totally, of 112 found articles,40 articles(42 in vitro and 5 animal studies) were included. The search terms were "Saccharum officinarum L.", "therapeutic", "and pharmacological". Various studies have shown that elder flower (Sambucus nigra). Possess Antioxidant activity, Immunotherapeutic effects, Anti-inflammation effects, Hepatotoxicity, Anti-obesity effects, Anti-malaria effects .elderflower (Sambucus nigra) is widely used for therapeutic and purposes that trigger its significant value. Various combinations and numerous medicinal properties of its extract, essential oils, its stems and leaves demand further and more studies about the other useful and unknown properties of this multipurpose plant.

Keywords: *Saccharum officinarum L.***,** therapeutic", "pharmacological"

INTRODUCTION

It is proved that herbal medicine is effective in the treatment of many diseases [1-10].

Saccharum officinarum, sugarcane, is a large, strong-growing species of grass in the genus *Saccharum*. It originated in Southeast Asia and is now cultivated in tropical and subtropical countries worldwide for the production of sugar and other products. *S. Officinarum*, a perennial plant, grows in clumps consisting of a number of strong unbranched stems. A network of rhizomes forms under the soil which sends up secondary shoots near the parent plant. The stems vary in color, being green, pinkish, or purple and can reach 5 m (16 ft) in height. They are jointed, nodes being present at the bases of the alternate leaves. The internodes contain a fibrous white pith immersed in sugary sap. The elongated, linear, green leaves have thick midribs and saw-toothed edges and grow to a length of about 30 to 60 cm (12 to 24 in) and width of 5 cm (2.0 in). The terminal inflorescence is a panicle up to 60 cm (24 in) long, a pinkish plume that is broadest at the base and tapering towards the top. The spikelets are borne on side branches and are about 3 mm (0.12 in) long and are concealed in tufts of long, silky hair. The fruits are dry and each one contains a single seed. Sugarcane harvest typically occurs before the plants flower, as the flowering process causes a reduction in sugar content [11-19].

Portions of the stem of this and several other species of sugarcane have been used from ancient times for chewing to extract the sweet juice. It was cultivated in New Guinea about 8000 years ago for this purpose. Extraction of the juice and boiling to concentrate it was probably first done in India more than 2000 years ago[17-20].

S. officinarum and its hybrids are grown for the production of sugar, ethanol, and other industrial uses in tropical and subtropical regions around the world. The stems and the byproducts of the sugar industry are used for feeding to livestock. Pigs fed on sugarcane juice and a soy-based protein supplement produced stronger piglets that grew faster than those on a more conventional diet. As its specific name (*officinarum*, "of dispensaries") implies, it is also used in traditional medicine both internally and externally [7, 20-32].

Antioxidant activity

Phenolic compounds in sugar cane (*Saccharum officinarum* L.) juice were identified .The phenolic extract obtained from sugar cane juice showed a protective effect against in vivo MeHgCl intoxication and potent inhibition of ex vivo lipoperoxidation of rat brain homogenates, indicating a potential use for beneficial health effects and/or therapeutic applications [33].

Immunotherapeutic effects

The effects of aqueous and ethanolic extracts of sugar cane (*Saccharum officinarum* L.) juice and bagasse, respectively on protective immune responses in industrial broiler chickens against coccidiosis was reported. Results demonstrated that both ethanolic and aqueous extracts of sugar cane possess immune enhancing properties and their administration in chickens augments the protective immunity against coccidiosis[34].

The phagocytic activity of peripheral blood leukocytes (PBL) in chickens orally administered sugar cane extracts (SCE) increased significantly, when compared with that of saline-administered control chickens. Delayed type hypersensitivity responses to human gamma globulin significantly increased in chickens orally administered SCE or PRF, compared with those of control chickens when evaluated on the basis of net increased wattle thickness at 24, 48 and 72 h after challenge. These results suggest that PRF of SCE has an immunostimulating effect in chickens[35].

A sugar cane extract (SCE) has been found to have an immunostimulating effect in several animals. Results suggest that SCE had a protective effect on LPS-induced endotoxin shock via one of possible mechanisms involving the suppression of NO production in the mouse peritoneal cavity [36].

Anti-inflammation

A mixture of fatty acids obtained from sugar cane (*Saccharum officinarum* L.) wax oil (FAM), in which the main constituents are palmitic, oleic, linoleic, and linolenic acids, was evaluated in two models of inflammation. The anti-inflammatory effects exerted by FAM may be due to its inhibitory effects on arachidonic acid metabolism. To our knowledge, this is the first report on the anti-inflammatory effect of sugar cane by-products in experimental models of arthritis and psoriasis [37].

Hepatotoxicity

The effects of *Saccharum officinarum* L. juice on oxidative liver injury due to INH in mice was investigated. Result showed that INH-induced liver injury is associated with oxidative stress, and co-administration of *Saccharum officinarum* L. juice (15 ml/Kg bw) may reduce this damage effectively in mice [38].

Anti-obesity

A polysaccharide fraction of *Saccharum officinarum* was tested for its effects on carbohydrate and lipid metabolism in normal rats and those fed a high sugar diet. Findings showed that endothelial cell swelling in ascending aorta was found in one third of rats receiving the high sugar diet control but no pathological change was observed in all of the rats concurrently treated with the polysaccharide fraction [39].

Anti-malaria

Phosphorus input from sugarcane, *Saccharum officinarum* L., cultivation in northern Belize and its effect on malaria transmission by changing vegetation structure and composition of wetlands and associated larval habitats was examined. The results indicate that marshes in proximity to agricultural fields are conducive for Typha growth, thereby providing habitat for the more efficient malaria vector[40].

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