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Pharmacological Properties of *PortulacaOleracea*

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Abstract

Purslane (*Portulacaoleracea*) is a medicinal plant that is a source of nutrient compounds including flavonoids, cardiac glycoside, fatty acids, terpenoids, vitamins, proteins and minerals. It posses nutritional potential as well as pharmacological properties such as hypoglycemic activity, antioxidant, Anticancer activity, Anti-inflammatory activity, Antiulcer activity, Antidiabetic activity, hypolipidemia activity and hypochloresterolemic. The aim of this review is to compile the literature on *Portulaca oleracea* in order to highlight its nutritional value and medicinal potential.

Keywords: *Portulaca oleracea., Antioxidant activity, Anticancer activity, Anti-inflammatory activity, Antiulcer activity, Anti-atherogenic activity and Immunomodulato activity, Antidiabetic activity, Hypoglycemic activity, Hypolipidemic activity, Hypochloresterolemic effects.*

Introduction

Kulfa (*Portulaca oleracea*) is a popular medicinal plant that is used not only as a succulent but also as a common medicine to treat many different types of diseases. *Portulaca oleracea* is eaten ordinarily as a potherb and used as remedy in the treatment of illness related to digestive tract, liver and stomach (Hasanain*et al.,* 2002). It is known by different synonyms in different countries such as *Portulaca oleracea* (USA and Australia), pigweed (England), Pourpier (France), Andulam (Malaysia) (Serena*et al.,* 2007). In India it also known as numerous name in different languages such as sanhti, punarava, paruppui keerai, gangavalli or kulfa. The name *Portulaca oleracea* was derived from the Latin word 'porto' which means "to carry" and 'lac' meaning milk, since the plant contains a milky juice (Starfield., 2000). It is allocated generally within the tropical and subtropical area of the world. It is appear a large run of antibacterial and other pharmacological properties (Serena *et al.,* 2007), anti-ulecerogenic, anti-inflammatory and antioxidant (Davey *et al.,* 2001). The nutritional quality of *Portulaca oleracea* has also been reported to be better than the major cultivated other green leafy vegetables as it possess approximately higher ascorbic acid (Pazdro*et al.,* 2010) and alpha-linolic acid (Barros *et al.*, 2011). Several studies indicate that it has been 5 times high omega-3 fatty acid than spinach contained (Dkhil, *et al.*, 2011). *Portulaca oleracea* has recently been known as the wealthiest vegetable resource of alphalinolic acid, (Sharma et al., 2011) a vital Omega-3 fatty acid (Simopoulas*et al.,* 2004).Hence it can be considered as an important substitute of fish for vegetarian and vegan people (Sharma *et al.*, 2002).

Nutritional quality of *Portulaca oleracea*

Nutritional potential of *Portulaca oleracea* is very high as compared to other conventional green leafy vegetables. *Portulaca oleracea* is very low in calories and rich in vitamins, high in dietary fiber, and minerals. So consumption of *Portulaca oleracea* serves as preventive dietary source for chronic diseases such as diabetes, and cardiovascular diseases (Palaniswamy*et al.*, 2002). It is great as well as richest source of β-carotene also. β-carotene is one of the natural antioxidant and it has been

protective role in lungs and mouth cancer (Sankhala *et al.*, 2005). This leaves also a wealthy source of vitamin C (Khanal*et al.*, 2010), some B- complex vitamins like riboflavin, niacin, pyridoxine, with nutritional minerals, such as iron, magnesium, calcium and phosphorus (Simopoulos*et al.*, 2004).

Pharmacological properties of *Portulaca oleracea*

A patent was issued in 2002 guided to the novel utilization of *Portulaca oleracea* for the treatment of medicine disease. Polysaccharides from *Portulaca oleracea* show range of pharmacological activities, such as, antioxidation, anti-inflammation, anticancer and immunity improving properties (Chen *et al.*, 2009). It has been reported to posses various pharmacological activities which have verify its therapeutic value as well as have established its importance as the functional food (Atlas *et al.*, 2013).

Antioxidant activity

The antioxidant activity of *Portulaca oleracea* is attributes to its components, for example Omega-3 fatty acids, β-carotene, and apigenin (Kaur*et al.*, 2001).The single cell gel electrophoresis assay (rapid and inexpensive method of measuring DNA strand breaks), confirmed that the aqueous extract of *Portulaca oleracea* leaves extensively alleviated hydrogen peroxide-induced oxidative DNA lesions in human lymphocytes (Lim *et al.*, 2007). It may be due to an antioxidant component in the aqueous extract (Remero et al., 2006).

Anticancer activity

In rats with ovarian cancer, polysaccharides clearly screen for free radicals and modulate immunity functions. The growth of cancer cells HeLa and HrpG2 is prevented by a soluble in aqueous polysaccharide isolated from *Portulaca oleracea* (Zhu et al., 2009). Other biological activities, such as homoisoflavonoids and alkaloids, clarify In-vitro cytotoxic activity in addition to polysaccharides against human lines of cancer cells (Tommonaro et al., 200).

Anti-inflammatory Activity

Portulaca oleracea removed in water exhibited dose dependent anti-inflammatory activity by inhibiting tumor necrosis cause, suppressing the nuclear causeκB (NF-κB), binding TNF-α-induced NF-κB and degrading (IκB) molecule inhibition. The extract suppresses vascular inflammatory process (Lee, 2012). Other researchers have also reported anti-inflammatory activity of this plant (Chan *et al*., 2000).

Antiulcer Activity

Individually, at 0.8 g/kg and 1.4 g/kg, aqueous and ethanolic extracts of *Portulaca oleracea* can decrease the intensity of HCl-induced Infections of intestines in a dose-dependent manner. Similar to the effect seen with sucralfate 0.1 g/kg. The ethanolic extract (0.8 and 1.4 g/kg) and the aqueous extract (0.56 and 0.8 g/kg) both suppress abstinence syndrome lsiones. Oral and inside the peritoneal cavity doses of the two concentrates conditionally help to pylorus ligation raises the pH of gastric juice in mice. As a result, *Portulaca oleracea* maintains a lot of promise as a successful remedy for gastrointestinal diseases.

Antidiabetic Activity

Portulaca oleracea reduces body mass index, unsaturated fat levels in the blood, and hyperinsulinemia. It also enhanced insulin sensitivity and lipid metabolism in diabetes mellitus rats after Streptozotocin (25mg/kg) injection and for age feeding with high calorie content, indicating that *Portulaca oleracea* reduces insulin opposition (L. Shen and colleagues, 2003). *Portulaca oleracea* leaves powder (5 g/day) raises high density lipoprotein cholesterol levels while reducing serum total cholesterol, triglycerides, low density lipoprotein cholesterol, gamma glutamyl transaminase, alkaline phosphatase, aspartate transaminase, overall and direct triglycerides fasting and postprandial glucose level, and BMI in type 2 diabetic subjects. *Portulaca oleracea* aqueous extract prevents diabetic vascular inflammation, hyperglycemia, and diabetic endothelial dysfunction in type 2 diabetic db/db mice So it indicated protective function against diabetes and vascular complications related it (A. S. Lee et al., 2012). The study of Gong et al., (2009) Reported that crude polysaccharide extract from plant of *Portulaca oleracea exhibit the property of* lowers blood glucose and modulates the glucose and lipid metabolism in alloxan induced diabetic mice.

Hypoglycemic activity

Portulaca oleracea leaves are very effective to build up insulin response and recover impaired blood glucose tolerance

(Ravichandran*et al.,* 2013). In type 2 diabetic mice, The aqueous extract of *Portulaca oleracea* reduce diabetic Inflammation of the vessels hyperglycemia, and insulin resistance (Sankhala et al., 2005) and diabetic endothelial dysfunction, indicating a role in diabetes prevention and associated vascular complications (Baskati,. 2005). Report also indicated that it was helpful in maintaining blood glucose level in alloxan-induces diabetic rats. *Portulaca oleracea* has the hypoglycemic potential and can be helpful on the diabetic treatment (Song *et al.,* 2005). Purslane supplementation has capable implication for improving glycemic status and lipid concentration in the blood especially in diabetic subjects, (Gopalan*et al.,* 2011).It has been given to alloxan-induces diabetic rats for twenty eight days for treatment purpose as hypolipidemic agent. The results reported that blood glucose and blood lipids were regulated in rats (Rufino*et al.,* 2010).

In Iran folk medicine, roots, leaves and seeds of *Portulaca oleracea* have been recommended for treatment of diabetes mellitus.

Anti-atherogenic and Hypochloresterolemic effects

Ahmed *et al.,* (2000) investigated the hydrochloric extract of *Portulaca oleracea* leaves on serum lipids of different groups of rabbits. The extract of *Portulaca oleracea* leaves was given to hyperchloresterolemic rabbits for 10 weeks by mouth with 200, 800 mg/kg of body weight. The result revealed that total cholesterol in the blood and the atherogenic index decrease in the groups which was treated with *Portulaca oleracea,* therefore it represent that plant may be helpful for action of hypercholesterolemia (Obied*et al.,* 2003). Studies show that high levels of cholesterol in the blood cause atherosclerosis and arterial disease and often lead to the heart attack. Low-density lipoprotein (LDL) is the main cholesterol-carrying lipoprotein in the blood which causes delivery of cholesterol from liver to the peripheral tissues. Cholesterol enriched diet was administered to rats and then treated with omega 3 fatty acids of *Portulaca oleracea* which as a result exhibited anti-atherogenic activity (Madiha*et al*., 2012).

Cardiac problems

Coronary diseases are of the most important and common diseases of recent years that have been spread in a wide range of advanced and poor societies, in all ages especially in middle ages (Park *et al.,* 2013). The main cause of coronary artery disease is atherosclerosis which is now the most frequent reason of death in developed countries. Spread of this disease is specifically attributed to the cholesterol and primarily to the lipid metabolism (Nechepurenko et al., 2011). et al., 2011).Utilization of *Portulaca oleracea* for four weeks decreased plasma cholesterol and increased level of high-density lipoprotein-cholesterol level in blood. Plasma triglyceride concentration were not affecting by the utilization of *Portulaca oleracea* supplement (Stroesucu *et al.,* 2013). *Portulaca oleracea* supplement may have the possible to modify blood lipid digestion system in hypercholestrolemic subjects and reduce the risk of sensitivity infection (Law *et al.,* 2003).

Anti hyperlipidemic activity

Hyperlipidemic is a major supporter to pathogenesis of heart disease and diabetes mellitus. There are so many medicines available in the market to treat the condition of hyperlipidemia (Liu *et al.,* 2009). But due to their adverse effects the person no longer takes. In place of hyperlipidemic medicine supplements, *Portulaca oleracea* is a better approach to treat hyperlepidemia in human subjects. Study was investigated in rats. Rats become hyperlipidemic by introducing the dexamathasaone (10mg/kg) for 8 days (Sudhakar*et al.,* 2010). Hyperlipidemic rats characterized by high serum cholesterol and high triglyceride asit indicates atherogenic index (Obadoni*et al.,* 2001). Ethanolic extract of *Portulaca oleracea* was given to the rats (200 and 400 mg/kg) and the results indicated that their levels of cholesterol and triglycerides were maintained near to the normal levels (Levy *et al.,* 2009).

Conclusion

Portulaca oleracea can be widely used in the pharmaceutical industry due to its wide spectrum of pharmacological properties as mentioned above. It is wonder plant and will indeed be the life saving plant of the 21st century if well harnessed. This review concludes that *Portulaca oleracea* has tremendous nutritional, functional and medicinal possibility, given that satisfactory studies are conducted.

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