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Der Pharmacia Lettre, 2016, 8 (19):437-441
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Healing properties of Purslane: A systematic review study

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ABSTRACT

Purslane is an annual succulent in the family Portulacaceae. The aim of this study was to overview therapeutic effects of Purslane. This review article was carried out by searching studies in PubMed, Medline, Web of Science, and IranMedex databases. The initial search strategy identified about 96 references. In this study, 63 studies were accepted for further screening and met all our inclusion criteria [in English, full text, therapeutic effects of Purslane and dated mainly from the year 1993 to 2016]. The search terms were "Purslane", "therapeutic properties", "pharmacological effects". Purslane possesses the relaxant properties, Antioxidant effect, Anti-inflammatory effect, antitumor effect, Cytoprotective effect, Homogenizing effect, Anti-fungal effect, Neuroprotective Effect, Antibacterial Activity, Hepatoprotective effects, Bronchodilatory effect. Purslane was shown to be very useful for its pharmacological activity besides, medicinal properties of its extract require more clinical trial studies about the other practical and hidden activities of this plant.

Keyword: Purslane, therapeutic properties, pharmacological effects, healing properties

INTRODUCTION

The use of medicinal herbs and herbal medicines is an age-old tradition [1-21] and the recent progress in modern therapeutics has stimulated the use of natural product worldwide for diverse ailments and diseases [17, 20, 26-34]. Purslane or popularly called Purslane is an annual succulent in the family Portulacaceae extending from North Africa and Southern Europe through the Middle East and the Indian Subcontinent to Malaysia and Australasia [35]. It is a warm-climate, herbaceous succulent annual plant. It is eaten extensively as a potherb and added in soups and salads around the Mediterranean and tropical Asian countries and has been used as a folk medicine in many countries [36]. Diverse compounds have been isolated from *Portulaca oleracea*, such as flavonoids, alkaloids, polysaccharides [37], fatty acids, terpenoids, sterols, proteins, vitamins and minerals [35]. Purslane possesses a wide spectrum of pharmacological properties such as neuroprotective [38], hepatoprotective [39], antidiabetic [40], antioxidant [41], antifatigue [42], anti-inflammatory [43], and anticancer activities [41, 44]. Its leaves are used for diarrhea, postpartum bleeding [45], and intestinal bleeding [46].

Healing properties

The relaxant properties

The juice and aqueous extracts from the plant Purslane were tested for muscle relaxant properties on isolated nerve-muscle preparations. Ethanolic extracts caused an initial augmentation of twitch height in chick biventer cervicis

preparations and then blockade which appeared to be mediated by an action directly on muscle fibres rather than on neuromuscular transmission. It was concluded that the neuromuscular activity of extracts of Purslane is caused by high concentrations of potassium ions [47].

An aqueous extract of Purslane leaves and stems produced a dose-dependent relaxation of guinea pig fundus, taenia coli and rabbit jejunum and a dose-dependent contraction of the rabbit aorta. The extract may, therefore, act in part on postsynaptic alpha-adrenoceptors and by interference with transmembrane calcium influx [48].

Antioxidant effect

Antioxidant activities of three phenolic alkaloids, i.e., oleracein A [OA], oleracein B [OB] and oleracein E [OE], isolated from Purslane were determined. It was demonstrated that phenolic alkaloids served as a new class of antioxidant agents in this plant [49].

The protective effect of betacyanins from Purslane against the D-galactose [D-gal]-induced neurotoxicity in mice was assessed. These results suggest that the neuroprotective effect of betacyanins against D-gal-induced neurotoxicity might be caused, at least in part, by an increase in the activities of antioxidant enzymes with a reduction in lipid peroxidation [50].

The protective effects of ethanolic and aqueous extracts of Purslane on human lymphocyte DNA lesions were evaluated. These data suggest that the aqueous extract of *P. oleracea* can prevent oxidative DNA damage to human lymphocytes, which is likely due to antioxidant constituents in the extract [51].

Anti-inflammatory effect

In an animal study, the anti-inflammatory of Purslane was examined. The result showed that Oleracone as a novel alkaloid showed significant anti-inflammatory effect, with quick distribution and high bioavailability [52].

Vascular inflammatory process of an aqueous extract of Purslane was investigated. AP prevents the vascular inflammatory process through the inhibition of intracellular ROS production and NF- κ B activation as well as the reduction of adhesion molecule expression in TNF- α -induced HUVEC. These results suggested that AP might have a potential therapeutic effect by inhibiting the vascular inflammation process in vascular diseases such as atherosclerosis [53].

The protective effect of the aqueous extract of Purslane [AP] on diabetic vascular complications was investigated. It was found that the insulin immunoreactivity of the pancreatic islets remarkably increased in AP treated db/db mice compared with untreated db/db mice. Taken together, AP suppresses hyperglycemia and diabetic vascular inflammation, and prevents the development of diabetic endothelial dysfunction for the development of diabetes and its vascular complications [54].

Antitumor effect

The anti-tumor effects in vivo of unique polysaccharide component [POP] from Purslane was analyzed and it was found that POP could significantly inhibit the growth of transplantable sarcoma 180 and potentiate the animal's immune responses including an increase in the number of white blood cell [WBC] and CD4 [+] T-lymphocytes, as well as the ratio of CD4 [+]/CD8 [+]. It is suggested that the anti-tumor effect elicited by POP could be associated with its immunostimulating properties [55].

Cis and trans-isomers of feruloyl amides were evaluated for their antitumor activity. Long-term stability tests did not show any significant changes. Among all compounds and conversion mixtures collected, compound 6 exhibited the strongest inhibition of IL-6-induced STAT3 activation in Hep3B cells, with an IC₅₀ value of 0.2 μ M. This study is the first verification of the conversion rates and an equilibrium ratio of feruloyl amides. These results indicate that this natural material might provide useful information for the treatment of various diseases involving IL-6 and STAT3 [43].

Cytoprotective effect

The cytoprotective effect of ethanolic and aqueous extracts of *N.sativa* and *P.oleracea* against hemolytic damages induced by free radical initiator, AAPH [2, 2' azobis [2- amidinopropane] hydrochloride] was evaluated.

Cytoprotective effect of aqueous and ethanolic extracts of *N. sativa* and *P. oleracea* against AAPH- induced hemolysis may be related to antioxidant properties of these plants [56].

Homogenizing effect

Toxicological bioassays rely upon the differences in mean-based statistical tests between the exposed and unexposed plants, and exceptional plant individuals are treated as statistical outliers. Recently, low toxicant concentrations have been observed to affect gene regulation in exposed plant stands .it was concluded that the results supported the hypothesis that very low toxicant concentrations may have ecological effects on fast-growing plant species [57].

Anti-fungal effect

Root extracts of Purslane showed to inhibit zoospore motility. Inhibited zoospores rapidly settled to the bottom of the Petri dishes where they initially encysted, and then germinated within 1-2 h. This is the first report of factors which inhibit zoospore motility without killing or bursting the zoospores [58].

Neuroprotective Effect

Potential beneficial effects of Purslane ethanolic extract [POEE] against the neurotoxicity induced by MeHg in cerebellum and cortex of rats was assessed. POEE pretreatment offered protection from these behavioral changes. MeHg intoxication also caused histopathological changes in cerebellum and cortex, which was found to be normalized by treatment with POEE. The present results indicate that POEE has protective effect against MeHg-induced neurotoxicity [59].

Antibacterial Activity

Antibacterial active constituents from *P. oleracea* was investigated .The antibacterial activities against common enteropathogenic bacteria were evaluated for all compounds and the new compounds 1-4 showed significant antibacterial effect on enteropathogenic bacteria in vitro, which might contribute to revealing the treatment of *P. oleracea* in cases of bacillary dysentery[60].

Hepatoprotective effects

The protective effect of ethanol extract of purslane against carbon tetrachloride [CCl₄]-induced hepatic toxicity in rats was investigated. These results demonstrate that purslane exerts protective effects against CCl₄-induced damage in rat liver and supports a potential therapeutic use of purslane as an alternative for patients with liver diseases[61]. The hepatoprotective activity of the aqueous extract of the aerial parts of Purslane [*P. oleracea*] in combination with lycopene against carbon tetrachloride induced hepatotoxicity in rats was investigated. The oral administration of *P. oleracea* in combination with lycopene significantly ameliorates CCl₄ hepatotoxicity in rats[62].

Bronchodilatory effect

The bronchodilatory effect of the boiled extract of Purslane in the airway of asthmatic patients was examined. Results showed that the boiled extract of Purslane caused significant increases in all measured pulmonary function tests [PFTs], [$P < 0.05$ to $P < 0.01$]. The onset of bronchodilatory effect of extract was similar to that of theophylline beginning 60 min, but the effect of extract decline after 120 min after administration. In conclusion, the results of the present study showed that Purslane has a relatively potent but transient bronchodilatory effect on asthmatic airways [63].

CONCLUSION

Purslane was shown to be very useful for its pharmacological activity besides, medicinal properties of its extract require more clinical trial studies about the other practical and hidden activities of this plant.

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