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Pharmacognostic and Phytochemical Evaluation of Portulaca Oleracea

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Abstract: ***Portulaca Oleracea L. (PO) or Purslane is an annual grassy plant that is distributed in many parts of the world, especially the tropical and subtropical areas. PO has some pharmacological properties such as analgesic, antibacterial, skeletal muscle-relaxant, wound healing, anti-inflammatory. Portulaca Oleracea is globlely used both as vegetable and as herb for medical & therapeutic purpose. Hence, the need to investigate its phytonutrients. The areal part of Portulaca Oleracea were harvested air dried and powdered for this study. Chemical test were carried out on the aqueous extract & the powdered constituent to determine the phytoconstituent using standard procedure. The presence of Alkaloid specimen tannin, flavonoid, cardiacglyacoside, terpenoid , steroid, phlobatannin, protin, starch are determined. This reading Authenticates its use in drug production and other therapies and to inhance further usage research studies The pharmacognostic evaluation of plant material carried out In wich the morphological characteristic of plant was studied. The present study phytochemical testes were carried out and the presence of various chemical constituents in plant extracts was determined by preliminary phytochemical screening.***

Keywords: *Portulaca Oleracea*, Phytoconstituents, Extract

1. Introduction

Portulaca oleracea L. is a warm-climate, herbaceous succulent annual plant with a cosmopolitan distribution belonging to the Portulacaceae family. It is commonly known as purslane. (USA and Australia), rigla (Egypt), pigweed (England), pourpier (France), and MaChi-Xian (China), Ghol (India). [1] It is distributed widely in the tropical and subtropical areas of the world including many parts of the United States and is eaten extensively as a potherb and is added to soups and salads around the Mediterranean and tropical Asian countries. [2] Americans and aborigines of Australia grind the seeds of this plant into flour for use in mush and bread. [3] Portulacaoleracea also provides a source of nutritional benefits owing to its rich omega-3 fatty acids and antioxidant properties. [4] Portulaca oleracea has been used as a folk medicine in many countries, acting as a febrifuge, antiseptic, vermifuge, and so forth.[5] It exhibits a wide range of pharmacological effects, including antibacterial, [6] antiulcerogenic, [7] anti-inflammatory, [8] antioxidant, [9] and wound-healing properties.[10] It is listed by the World Health Organization as one of the most used medicinal plants, and it has been given the term “Global Panacea”. [11] The Chinese folklore described it as “vegetable for long life” and it has been used for thousands of years in traditional Chinese Medicine. [12-13] It is cold in nature and sour in taste and is used to cool the blood, stanch bleeding, clear heat, and resolve toxins. The dried aerial part of this plant is indicated for the treatment of fever, dysentery, diarrhoea, carbuncle, eczema and hematochezia, with recommended dose of 9-15 g. [14-15] Portulaca oleracea has a high potential to be used as human and animal food and to be utilized as a pharmacological agent in medicine. P. oleracea is very important because of its special medical function and all its therapeutic values are attributed to the presence of many biologically active compounds which include flavonoids (Apigenin, kaempferol, quercetin, luteolin, myricetin, genistein, and genistin), Alkaloids, Coumarins, anthraquinone glycoside, cardiac glycoside, and high content of ω-3 fatty acids. [16] Purslane is distributed all over the world; Portulacaoleracea is a herbaceous annual, native of many parts of Europe, found in the East and West Indies, China, Japan and Ascension Island, and though found also in the British Isles is not indigenous there [17]. It is a weedy summer annual species that is abundant throughout the world, invading vegetable gardens, bare areas, low maintenance lawns, ornamental plantings, and agricultural areas. It is particularly well adapted to the warm, moist conditions found in California’s irrigated agricultural and ornamental sites. It has been cultivated in India and the Middle East and has been popular in Europe since the Middle Ages. Common purslane germinates in California from February to March in the southern desert areas to late spring in cooler areas when soil temperature reaches about 60°F. For an early crop, the seed is best sown under

protection in early spring and can then be planted out in late spring. Outdoor sowings in situ take place from late spring to late summer, successional sowings being made every two to three weeks if a constant supply of the leaves is required. [18] It germinates very near to or at the soil surface in large numbers after an irrigation or rain. Most of the tiny seedlings die, but the survivors grow rapidly and can produce flowers in a few weeks. The fleshy stems of common purslane can remain moist and viable for several days after cultivation and hoeing, and reroot to form "new" plants when gardens or fields are irrigated. Because of its ability to produce large numbers of seeds, common purslane can rapidly colonize any warm, moist site. It Requires a moist light rich well-drained soil in a sunny position.[19] Plants will not produce good quality leaves when growing in dry conditions. [18] The plants take about six to eight weeks to produce a crop from seed and can then be harvested on a cut and come again principle, providing edible leaves for most of the summer. [18] Common purslane is low in stature and forms dense mats. These vegetative mats utilize available moisture and nutrients and screen out light to the soil surface, preventing emergence of other seedlings. Common purslane is unsightly, reducing the esthetic value of turf and ornamental plantings. In commercial situations common purslane can limit summer vegetable production and reduce the efficiency of harvesting nut crops, such as almonds and walnuts. In this thesis the extraction of portulacaoleracea is extracted and phytochemical tests are carried out.

Plant Profile: It was first identified in the United States in 1672 in Massachusetts. The name Portulaca is thought to be derived from the Latin "porto" meaning to carry and "lac" meaning milk, since the plant contains a milky juice. [20] oleracea from Latin, meaning pertaining to kitchen gardens referring to its use as a vegetable. The use of this plant as a vegetable, spice and medicine has been known since the times of the ancient Egyptians and was popular in England during the middle class. [21]

Purslane Plant

Classification:

Kingdom	Plantae
Subkingdom	Tracheobionta
Superdivision	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Caryophyllidae
Order	Caryophyllales
Family	Portulacacea
Genus	*Portulaca L.*
Species	*Portulaca Oleracea* L[22].

2. Literature Survey

1) **Okafor I. A. & Ezejindu D. N.*, *et al (2014)*** Portulacaoleracea (PO) is globally used both as a vegetable and as a herb for medical and therapeutic purposes hence the need to investigate its phytonutrients. The aerial parts of PO were harvested, air dried and powdered for this study. Chemical tests were carried out on the aqueous extract and the powdered specimen to determine the phytoconstituents using standard procedures. The presence of Alkaloid, saponin, tannin, flavonoid, cardiac glycoside terpenoid, steroid, phobatannin, protein and starch were accessed qualitatively while flavonoid, tannin alkaloid and saponin were determined quantitatively and itwas found not to contain steroid and phobatanin but containing 32% of saponin as its highest constituent with 26% alkaloid. This finding authenticates its use in drug production and other therapies, and to enhance further its usage and research study.
2) **Bagepallisrinivasa Ashok Kumar *, *et al (2008)*** Portulacaoleracea Linn, belongs to family Portulaceae and is a widely distributed weed. It has been used as a folk medicine in many countries as diuretics, febrifuge, antiseptic, antispasmodic and vermifuge. This paper deals with the microscopic study of leaf; stem and root of Portulacaoleracea, along with thephysico-chemicalandpreliminaryphytochemicalanalysesthatwere alsostudied.
3) **C.V. Chaudhry*, *et al* (2013)** Portulacaoleracea belongs to the family of Portulacaceae in the traditional system of medicine and consists of large number of various medicinal and pharmacological importance hence represents a priceless tank of new bioactive molecules. Portulacaoleracea consists of number of pharmacological activities like antimicrobial, antioxidant, antidiabetic, neuronal, antinociceptive and anti-inflammatory activity. This review helps to create an interest in Portulacaoleracea in developing new formulations with more therapeutic and economic value.
4) **Yan-Xi. *Zhous**, et *al* *(2015)*** Portulacaoleracea L., belonging to the Portulacaceae family, is commonly known as purslane in English and Ma-Chi-Xian in Chinese. It is a warm-climate, herbaceous succulent annual plant with a cosmopolitan distribution. It is eaten extensively as apotherb and added in soups and salads around the Mediterranean and tropical Asian countries and has been used as a folk medicine in many countries. Diverse compounds have been isolated from Portulacaoleracea, such as flavonoids, alkaloids, polysaccharides, fatty acids, terpenoids, sterols, proteins vitamins and minerals. Portulacaoleracea possesses a wide spectrum of pharmacological properties such as neuroprotective, antimicrobial, antidiabetic, antioxidant, anti-inflammatory, antiulcerogenic, and anticancer activities. However, few molecular mechanisms of action are known. This review provides a summary of phytochemistry and pharmacological effects of this plant.
5) **Shazia Syed *, *et al* (2016)** Portulacaoleracea L. is a common weed distributed throughout the world. It has been used as nutrition and medicinal plant since thousands of years ago. This highly nutritious plant is

used as vegetable in India, Persia and Europe. Both leaves and seeds are also used for medicinal purposes. The constituents reported in literature include carbohydrates, protein, fats, minerals and vitamins. Tannins, saponins, oxalate, urea, alkaloids, sitosterols mono, diandtriterpenes, phenoliccompoundsandomega-3fattyacidsaremajorphyto-constituents present in the plant. The plant is reported to possess many pharmacological activities including antioxidant, anticancer, antidiabetic, hypocholesteremic, neuroprotective, hepatoprotective, nephroprotective, anti-inflammatory, antiulcer, antimicrobial, wound healing, uterine bleeding control and wormicidal and insecticidal activities. The plant can be further investigated for other pharmacological activities as it contains variety of chemical constituents.

3. Material and Methods

1) Morphological and Organoleptic Evaluation

Colour	Stem-Reddish Brown Leaves-green Seed-Black
Odour	Characteristic
Taste	Slightly Herby and Lemonly Tart
Stem	Stem is cylindrical, Thick, Full and Lucius. It is completely hairless
Underground system	Taproot, Other Root May Develop From Branches
Leaves	Leaves are simple and opposite. Sometime alternate along the stem The leave are globerous
Flowers	The flowers are yellow
Fruit	Fruit is a deniscent capsule globular shape
Seed	Seeds are orbicular 0.5mm in diameter seed coat in black

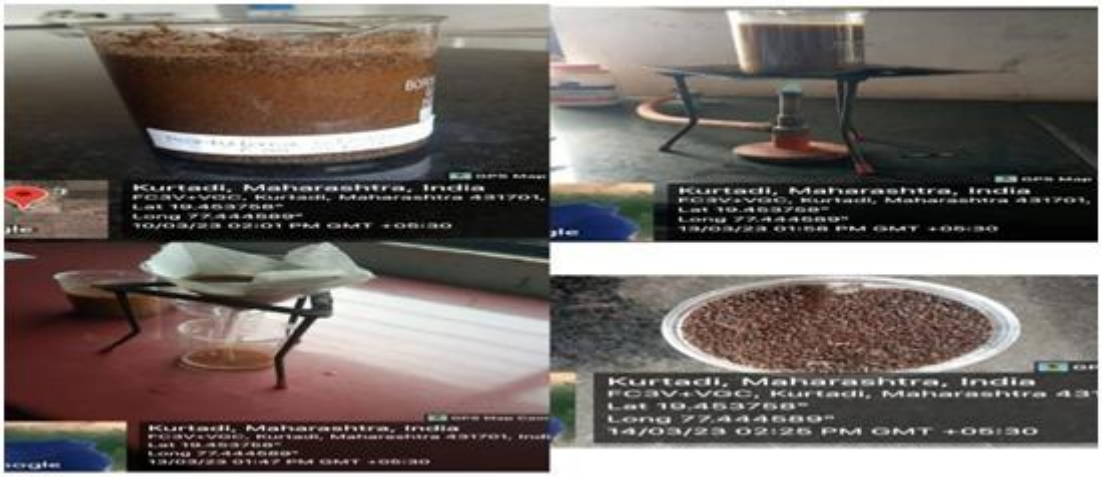
Plant Collection

Fresh aerial parts of PO plant was harvested from the surrounding and agriculture field The plant used for both quantitative and qualitative screening was washed, cut into smaller parts (for easy drying), shade-dried for two weeks and finely powdered with a mechanical grinder yielding 200gm of powder.[23]

Dried Powder

Preparation of Plant Extract

The aqueous extract used in this research was prepared by soaking the powdered plant (100g) in distilled water in a ratio of 1:9 for 24 hours and the extract filtered using filter paper producing a 16% yield of extract (16.20g). The tests were carried out using different quantities of the aqueous extract. [23]



Extraction Process

Qualitative and Phytochemical Evaluation

1) Test for alkaloids

5g of the powdered plant were placed in a test tube and 20ml methanol poured into the test tube. The mixture was allowed to boil for 2 minutes in water bath, cooled and filtered.

a) Two drops of dragendoff's reagent (solution of potassium bismuth iodide) was added to 2ml of filterate , giving characteristics reddish brown colour
b) Two drops of wagner's reagent (solution of iodine and potassium iodide) was added to 5ml of the filterate, giving characteristics reddish brown colour
c) Two drops of Meyers reagent (potassium mercuric iodide solution) was added to another 2ml of filterate, giving characteristics cream colour
d) Two drops of hager's reagent (saturated solution of

picric acid) was added to a 5ml of filterate, giving characteristics yellow colour

2) Test for saponin

2g of the powdered sample was boiled in 20ml of distilled water in water bath and filtered. 10ml of the filtrate was mixed with 5ml of distilled water and shaken vigourously for a stable persistent froth. The frothing was mixed with three drops of olive oil and shaken vigorously, then observed for the formation of emulsion.

3) Test for tannin

0.5g of the powdered samples was boiled in 20ml of water in a test tube and then filtered. A few drops of 0.1% ferric chloride was added and observed for brownish green or blue-black colouration.

4) Test for flavonoid

10ml of ethyl acetate was added to about 0.2g of the powdered plant material and heated on a water bath for 3 minutes. The mixture was cooled, filttered and 4ml of filterate is shaken with 1ml of dilute ammonia solution. The layers are allowed to separate and the yellow colour in the ammonical layer indicates the presence of flavonoids.

5) Test for cardiac glycosides (Keller-killani test)

5ml of extracts was treated with 2ml of glacial acetic acid containing a drop of ferric chloride solution. This was underplayed with 1ml concentrated sulphuric acid. A brown ring of the interface is a deoxysugar characteristic of cardenolides. A violet ring appears below the brown ring, while in the acetic acid layer, a greenish ring may form just gradually throughout thin layer.

6) Terpenoids

5ml of plant extract were mixed in 2ml of chloroform and 3mlconcentrated sulphuric acid carefully added to form a layer. A reddish brown colour interface was formed to show positive results for terpenoids.

7) Test for steroids

A 9ml portion of ethanol was added to 1g of the powdered leaves. The filterate is concentrated to 2.5ml on a boiling water bath and 5ml of hot water was added. The mixture is allowed to stand for 1 hour and the waxy matter filtered off. The filtrate extracted with 2.5ml of chloroform using a separating funnel. To 0.5ml of the chloroform extract in a test tube, 1ml of concentrated sulphuric acid was added to form a lower layer. A reddish brown interface shows the presence of steroids.

8) Test for phlobatannin

The presence of red precipitate when an aqueous extract of the plant was boiled with 1% aqueous hydrochloric acid showed the presence of phlobatannin.

9) Test for protein

Few drops of picric acid was added to a little portion of aqueous extract of plant. A yellow precipitate indicates the presence of proteins

10) Test for starch

0.1g of the powdered plant was mixed with a drop of iodine solution in a test tube. A blue-black coloration indicates the presence of starch [23].

Phytochemical Test

4. Observations & Results

This study determine the presence of medicinally active phytoconstituents in *PORTULCA OLERECAE.L* plant sample summarized in tables and The qualitative estimation saw the presence of alkaloid, saponin, tannin, flavonoid, cardiac glycoside, terpenoid, protein and starch in plant sample either in abundant or very abundant measure while there is absence of steroid and phlobatannin.

S. No	Test	Observation	Inference
1	Test for Alkaloid		
	a) Dragendoff's Reagent	The precipitation gives reddish brown colour	Presence of alkoloid
	b) Wagnor's Reagent	The precipitation gives reddish brown colour	Presence of alkoloid
	c) Meyer's Reagent	The precipitation gives Cream colour	Presence of alkoloid
	d) Hager's Reagent	The precipitation gives Yellow colour	Presence of alkoloid
2	Test for Saponins	Formation of emmulsion	Presence of Saponins
3	Test forTanins	Brownish greenor blue black colour	Presence of Tanins
4	Test for Flavonoids	Yellow colour in ammonia layer	Presence of Flavonoids
5	Test for cardiac glycosides	Greenishring	Presence of Cardiac Glycosides
6	Test for Terpenoid	Reddish brown colour	Presence of Terpenoid
7	Test for Steroids	Reddish brown colour	Absence of Steroid

5. Discussion

The phytochemical constituent of Portulaca Oleracea is presented in the result table. Alkaloid, tannin, flavonoid, ardiac glycoside, terpenoids, protein and starch have been observed as the active phytoconstituent of portulaca oleracea. The presence of these constituent in most plants has been

reported to have proven medical implications. The presence of saponin may be indication of the plant major use as antihelmintic and antiplogistic. The presence of tannin in the plant shows its potential as an antiviral, antibacterial, antiparasitic. While cardiac glycosides are used in the treatment of conjestive heart failure and cardiac arrhythmia. The terpenoid have been implemented in antibacterial and antineoplastic function. Hence, the use of the plant to treat burns, skin diseases insect's stings. Portulaca Olerasea which is a routine vegetable for soups and salads which is highly nutritious with its contents of starch and protiens this suggest its potential use as growth supplements for children as complemented with its use in piggery. Hence, it is called pigween. The presence of flavonoid is indicative of its potential use as an Antiallergic, Antiinflammetary, Antioxidative, Antimicrobial, Antidiarrhea and Anticancer. In support of the finding of this present study, alkaloids have been reported to be important chemical constituent of this species. Alkaloids are known with its pharmacological use for producing Analgesics, stimulants, Antihypertensive, Anticancer, Antibacterial, Antiarrythmia, Antiastha, Antimalaria drug. The presence of steroid in portulacaoleracea extract as against the result of this present study. The established reproductive function of portulacaoleracea may be depend on the plant content of steroid which is potential starting material for reproductive hormones. Pholobaatannin (a condensed form of tannin) has been found absent on Portulaca Oleracea examined.

6. Conclusion

PO is used locally for herbal medicine and as food but yet to be fully explored. The plant has been reported as a global panacea due to its several medicinal uses. The phytoconstituents observed in this study shows the plant's potency for use in producing pharmaceutical bioactive compounds for therapeutic drugs Portulacaoleracea is of considerable importance to the food industry and also possesses a wide spectrum of pharmacological properties such as neuroprotective, antimicrobial, antidiabetic, antioxidant, anti-inflammatory, antiul-cerogenic, and anticancer activities, which are associated with its diverse chemical constituents, including flavonoids, alkaloids, polysaccharides, fatty acids, terpenoids, sterols, proteins, vitamins, and minerals. Although bioactivities of extracts or compounds isolated.

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