



A Review on the pharmacological studies on the Portulaca oleracea

**1.Kharat Govind Bajirao. HSBPVT GOI college of pharmacy,
Kashti**

**2. Kate Akshay Ravsaheb . HSBPVT GOI college of pharmacy ,
Kashti**

**3. Darandale Niranjana Vikas. HSBPVT GOI college of pharmacy
kashti**

**4.Tupe Mayur Ravindra . HSBPVTs GOI College of Pharmacy Kashti
Corresponding Author**

1.Kharat Govind Bajirao HSBPVT GOI college of pharmacy , kashti

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 and a radical scavenger. This review article is focused on the anti-inflammatory, immuno-modulatory, anti-oxidant and anti-tumor activities of the PO. (1) Anti-inflammatory, immuno-modulatory, anti-oxidant and Anti-tumor effects of PO were searched using various databases until the end of August 2018. The online literature was searched using PubMed, Science Direct, Scopus, Google Scholar and Web of Science. Our review showed that PO exerts its effects through anti-inflammatory

properties and balancing the adaptive and innate immune system depending on situations. PO acts as immune-modulator and anti-oxidant agent in both inflammatory states by the dominance of T2 response such as asthma, cancer and atopic dermatitis and evoked T1 disorders including hepatitis and multiple sclerosis.(2)

Keyword -: Purslane, immuno-modulation, inflammation, Portulaca oleracea

Introduction -:

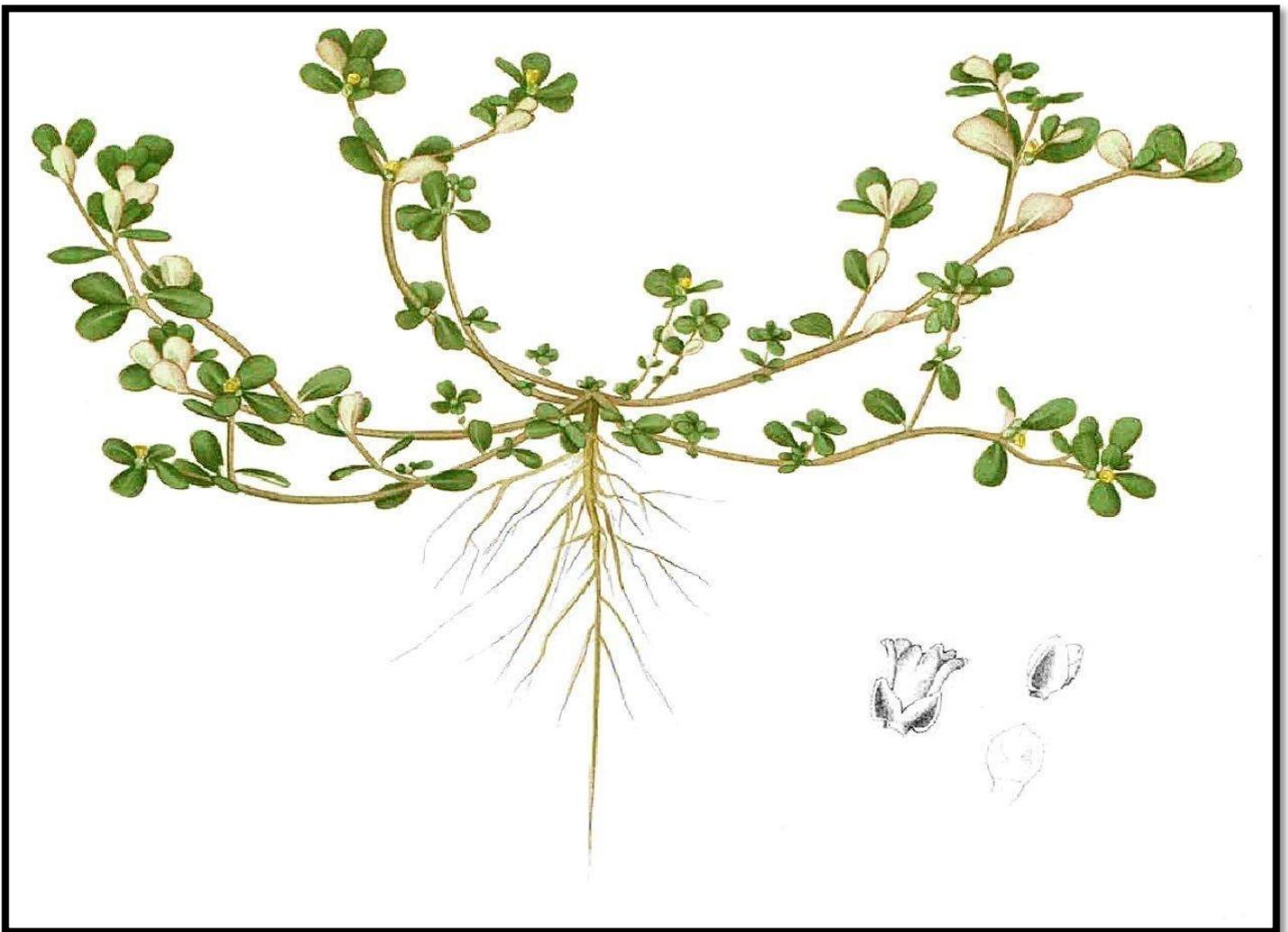
Once in a while one comes across a plant that is so outstanding that one wonders how on earth it has been overlooked. Purslane (Portulaca oleracea) is one such plant. It is commonly called purslane or pigweed in English language, papasan in Yoruba, babajibji in Hausa, ntioke, ntilimoke, ntiike or idiridi in Igbo. Portulaca oleracea, is a member of the Portulacaceae family with more than 120 different species.(3) 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 Ages³³, why it has fallen into obscurity is quite strange (4)

Origin -: 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(10) 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 Ages (33)(5)

Classification -:

| | |
|----------------------|------------------------|
| <i>Kingdom</i> | - <i>plantae</i> |
| <i>Superdivision</i> | - <i>spermatophyta</i> |
| <i>Division</i> | - <i>magnoliophyta</i> |

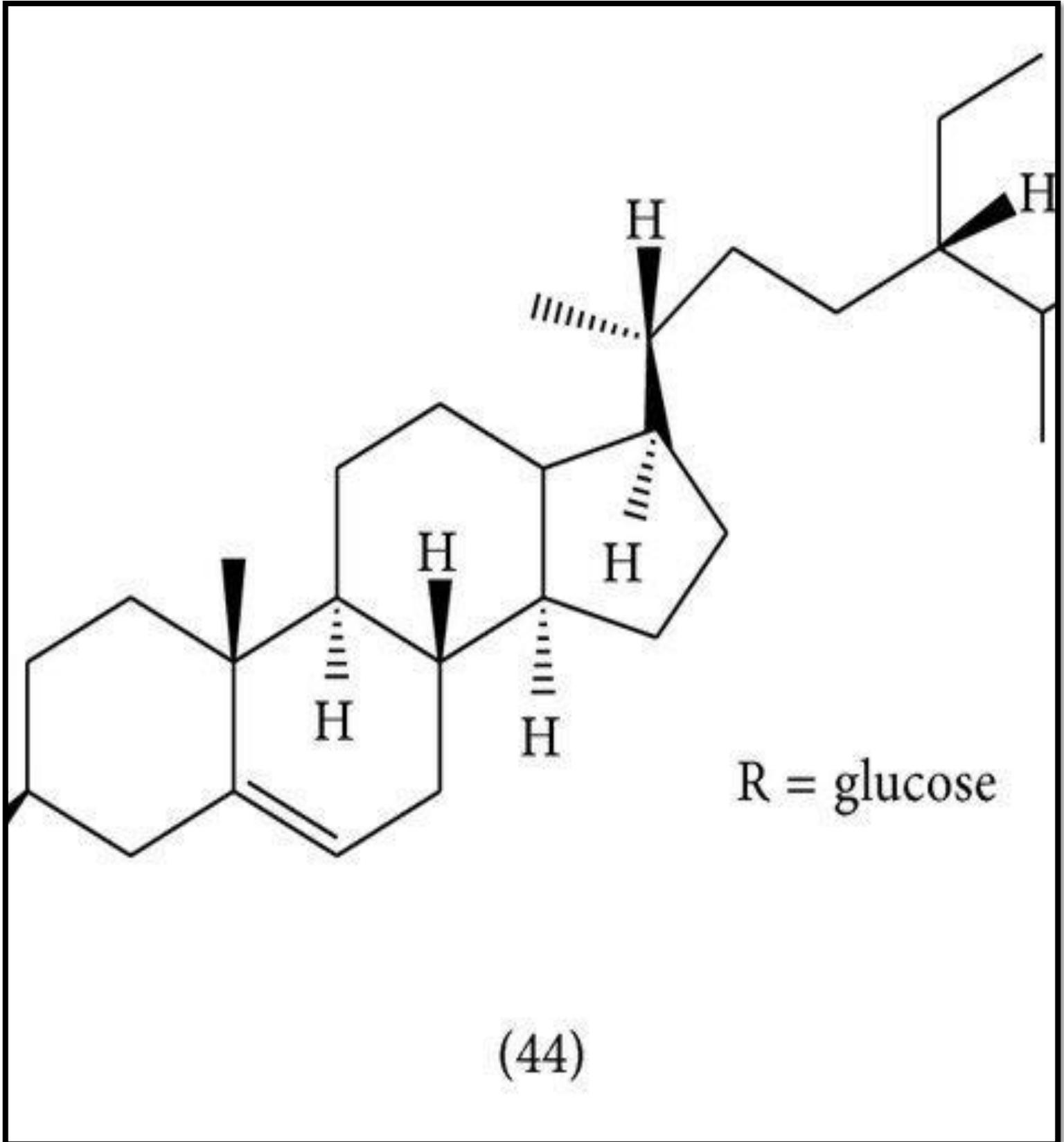
- Class* - *magnoliopsida*
Subclass - *caryophyllidae*
Order - *caryophyllales*
Family - *portulacaceae*
Genus - *portulacae L.*
Species - *Portulacae oleracea L(50)(6)*

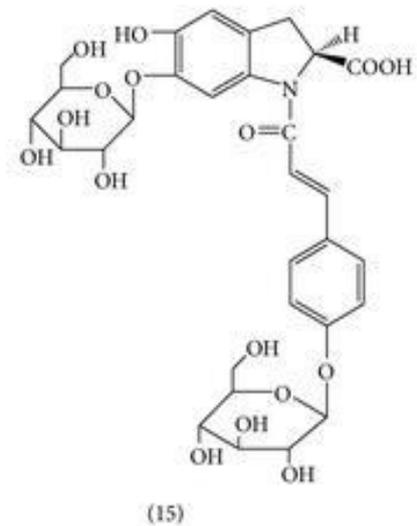
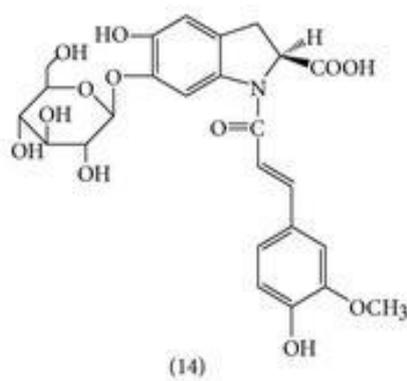
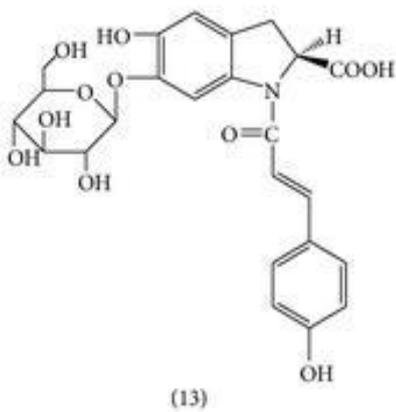
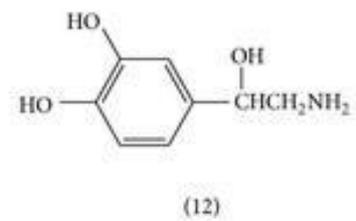
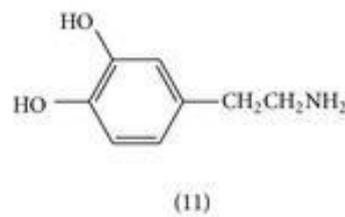
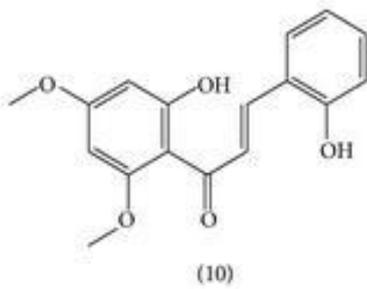
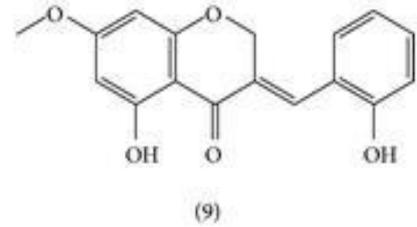
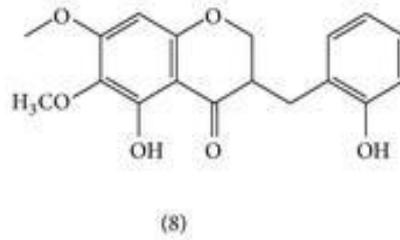
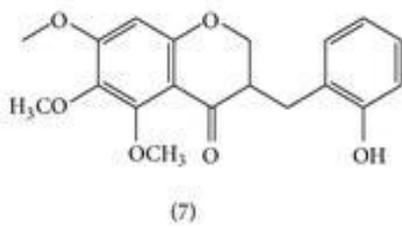
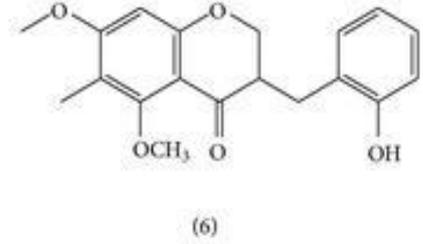
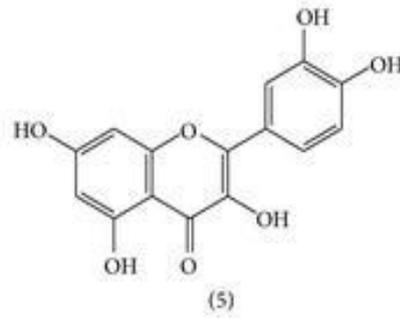
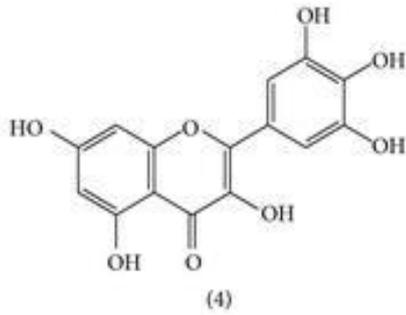
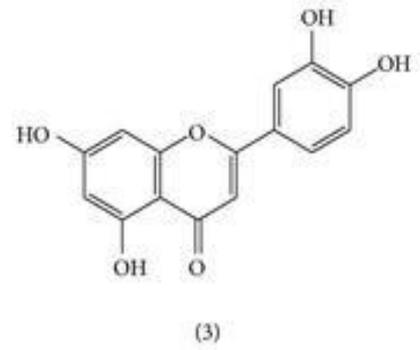
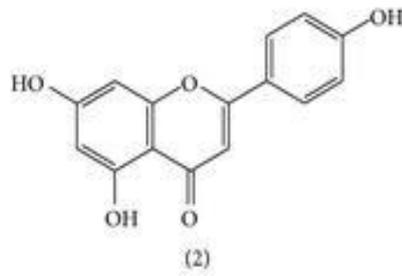
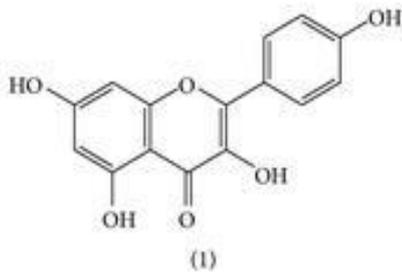


Plant Picture



STRUCTURE -:





Pharmacological Activity

Anti-oxidant Activity

There are many studies indicating the protective effects of PO could be through its anti-oxidant activity (Table 2). Proline and betalain pigments which are produced in Purslane showed anti-oxidant properties and protect the Plant against saline stress [41]. (PO is the main source of Anti-oxidant vitamins such as α -tocopherol, ascorbic acid, -carotene and glutathione.(7) Dkhil et al evaluated the anti-oxidative effects of PO aqueous juice in adult male Wistar albino rats. The results revealed that oral administration of PO juice reduced the liver function tests (ALT, AST, γ -GT and ALP) and kidney function tests (the levels of urea, serum creatinine and blood urea nitrogen). Moreover, PO juice augmented the levels of superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx), Glutathione-S-transferase (GST), glutathione reductase (GR), glutathione (GSH) as well as diminished MDA and NO in liver, kidney and testis of rats [11]. Aging is associated with a progressive reduction in immune activity or immunosenescence. In fact, aging is the Result of endogenous oxygen radical accumulation that is produced by oxidative changes of biomolecules [42].(8) Bhagalpur et al appraised the effect of PO on the reproductive system of D-galactose aged female mice. They reported that D-galactose significantly enhanced the LH and FSH level and MDA content, decreased estrogen and Progesterone level as well as SOD and CAT activities. PO markedly reversed these changes and improved aging induced by D-galactose [42]. Gai et al showed that purslane seed oil (PSO) exhibits a significant dose-dependent in-vitro anti-oxidant activity and inhibits the oxidation of horse oil lipids during storage. Moreover, PSO notably prevented tumor cell growth in cervical cancer HeLa cells, esophageal cancer Eca-109(9)

2 . Anti- diabetic activity-:

An et al⁵ had reported the anti diabetic activity in aqueous extract of portulaca oleracea in rosiglitazone induced diabetics . P.oleracea treatment markedly lowered blood glucose, plasma triglyceride, plasma level of LDL- cholesterol and systolic blood pressure in diabetic mice. (10), Portulaca Oleracea significantly increased plasma level of HDL-cholesterol and insulin level. The impairment of Ach and SNP- induced vascular relaxation of aortic Rings were ameliorated by PO treatment in diabetic db/db mice and it also showed that over expression of VCAM-1, ICAM-1, E-selectin, MMP-2 and ET-1 were observed in aortic tissues of untreated db/db mice, which were significantly suppressed by treatment with PO. (11) this study, it was found that the immune reactivity of the pancreatic islets remarkably increased in treated

diabetic mice compared with untreated diabetic mice. Thus they concluded that PO Suppresses the hyperglycemia and diabetic vascular inflammation, and prevents the development of diabetic endothelial dysfunction for the development of Diabetes and its vascular (12)

3 . Nephroprotective activity-:

Glamorize et al²⁰ reported the nephroprotective effect of aqueous and ethanolic extract of PO against cisplatin- induced renal toxicity in rats. After 5 days of investigation of the possible protective effect, portulaca oleracea was administered as highest dose (0.8 and 2g/kg) for 6-12h before cisplatin Injection and had BUN and SCR levels significantly lower than those receiving cisplatin alone. The study concluded that the aqueous extract of PO Possesses marked nephroprotective activity and could have a promising role in the treatment of acute renal injury induced by nephrotoxins, especially Cisplatin.(13)

4. Antitumor Activity-:

Previous studies showed that traditional medicine couldBe a promising source of potential anti-cancer drug Therapy (Table 4). Some of the compounds found in PO Including omega-3 fatty acids and in particularly ALA Are considered as tumor suppressants [41]. It has been Demonstrated that PO polysaccharides bear anti-tumor Activities through strengthening the immune system [36]. (14)In addition, polysaccharides also have anti-viral and analgesic activities [41]. Shen et al proved that PO polysaccharides inhibit the tumor growth in animal models and Increase animal immunity. Treatment with these polysaccharides enhanced the amount of CD4+ T lymphocytes, WBC numbers and the ratio of CD4+/CD8+ In the peripheral blood of transplantable sarcoma 180 mice. (15)Furthermore, PO polysaccharides decreased the tumor growth, AST, ALT, BUN and creatinine levels in S180-bearing mice. Terefore, it can be concluded that the anti-tumor efect Of PO polysaccharides is related to its immuno-stimulating activities [49]. Farshori et al fgured out the anti-cancer properties of PO Seed extract on the human hepatocellular carcinoma cells (HepG2).(16) Te results of this study revealed that PO remarkably mitigates the HepG2 cell viability in a dose-dependent manner. Furthermore, PO seed extract diminished the Typical morphology and adhesion capacity of HepG2 cells.It is concluded that PO possesses anti-cancer properties n HepG2 cells [50].

5 .Anti-microbial activity-:

Ramesh & Hamumantapa⁴² had reported the phytochemical and anti-microbial activity in aerial parts of chloroform and ethanolic extracts of Portulaca oleracea by agar diffusion method against five bacteria and three fungi (bacteria like staphylococcus aureus, bacillus cereus, Klebisilla Pneumonia,aspergillus niger and

nerospora crassa). Ethanolic crude extract showed maximum effect on organisms like staphylococcus aureus, klebisilla Pneumonia and neurospora crassa, Whereas chloroform extract showed moderate effect on Klebisilla pneumonia, aspergillus niger and nerospora crassa. The results of this present study supported the folklore usage of the studied plant and suggest that, this plant extract posses compounds which is Having antimicrobial agent in the form of drugs for the therapy of infectious diseases caused by pathogens Zhao et al⁵⁷ investigated the effects of Portulaca oleracea extracts on growth performance and microbial populations in the ceca of broilers. Results showed P. oleracea extracts have no distinct influence on intestinal pH and that P. oleracea extract supplementation significantly altered the cecal Bacterial community without affecting the intestinal pH.

Toxicology :-

Purslane is accused of poisoning sheep and cattle⁶; it is found to contain up to 9% oxalic acid (dry weight) and prolonged ingestion of the plant Was stated to cause incoordination of gait and tetanic conditions in sheep. Further experiments, in which three sheep were fed purslane containing 6.1 and 3.5% oxalic acid dry weight failed to produce any disorders in calcium metabolism analyses but post mortem findings were described⁵⁴. Oxalates and noradrenaline have also been isolated from P. oleracea indicating a possible hazard in the taking of its teas⁶.(17)

Conclusion :-

Te results indicated that PO signifcantly inhibits the tumor cell growth in a time- and dose- dependent manner. Additionally, these studies suggest that PO may exert its Effects through anti- infammatory properties and balancing the adaptive and innate immune system depending On situations. (18)As mentioned previously, PO can inhibit the infammatory states by the dominance of T2 response such as asthma, cancer and atopic dermatitis and Modulate this imbalance toward T1 response. In contrast, the results showed that PO modulates the evoked T1 disorders including hepatitis and multiple sclerosis. Taken together, PO is known Anti-oxidant medicinal herb, which may be introduced for The treatment of many immunological based disorders. In addition, it could be used as a substitute for synthetic Anti- oxidant in food preservation and may be potentially useful as a food and cosmetic ingredient. Meanwhile, The oxidative stress can cause hyper-sensitivities, so PSO Is expected to develop a health care product for the prevention and mitigation of hyper-sensitivities symptoms.

PSO is expected to show superior anti-oxidant activity And anti-tumor effects due to its high omega-3 fatty acid Content. Tus, it is a good candidate as both a healthy food And cosmetic ingredient.(19)

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