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Assessment of Bioactive Constituents of Purslane (P. oleracea) Leaves grown around the Vicinity of Adamawa State University Mubi, Adamawa State Nigeria

Zira, S. P.
Department of Pure and Applied Chemistry, Adamawa State University Mubi Nigeria.

ABSTRACT: Purslane (Portulaca oleracea L.) is considered an exotic weed due to it's amazing characteristic features and high nutritional advantages. It is identified as an excellent source of omega-3 fatty acids, anti-oxidant, vitamins and essential amino acids. The phytochemical constituents of the plant such as flavonoid, alkaloids, saponins, steroids, terenoids, tanins, phlobatanins and anthraquinones of the leaves were studied in addition to the vitamin composition through extraction using Soxhlet apparatus and the ethanol was evaporated using a waterbath (GFL, Germany) at 40^{oC} for 2 hours. Simple and stamdard qualitative methods described by Chindo et al (2014) was used. The study showed the presence of tanins, saponins, alkaloids, anthraquinones, phlobatanins, flavonoids, starch, protein, cardiac glycoside and terpenoids. The phytoconstituents observed in this study shows the plant's potency for use in producing pharmaceutical bioactive compounds for therapeutic drugs.

KEYWORDS: Portulaca oleracea, Phytochemicals, Bioactive, Purslane, Constituents

I. INTRODUCTION

Since time immemorial, human populations have always been in search for plant with therapeutic potentials. Although orthodox medicine has been accepted by some populations of the world yet greater percentage still relies on natural remedies because of their cheap and easy availability (Simopous *et al*., 2017).Purslane (*Portulaca oleracea L*.) is a common weed that grows all over the world and is one of the most widespread weed species in summer crops which may reach 40 cm in height (Okafor & Ezejindu, 2014). Purslane is a native of Persia and it was used over 2000 years ago (Akshay *et al.*, 2017). It is a commercially cultivated vegetable in many parts of the world including Asia and Middle East (Kamal *et al*, 2014). It has an extensive old World distribution extending from North Africa through the Middle East and the Indian Sub-continent to Malaysia and Australia (Vincenzo *et al*., 2018).

Though the specie status is uncertain in the New world, it is considered an exotic weed (Okafor & Ezejindu, 2014). It is considered as an invasive weed. However, it has great potential to become a new crop since its identification as one of the best plant sources of fatty acid, α-linolenic acid, as well as some antioxidants (α-tocopherol, β-carotene, ascorbic acid, and glutathione) (Shazia *et al.*, 2016). It is a well-known edible plant, widespread in temperate and tropical regions of the world (Sushmita, 2018). It is an herbaceous and annual plant with a fleshy stem and thick, green, succulent leaves and small black seeds that have medicinal properties. It has smooth, reddish, mostly prostrate stems and alternate leaves clustered at stem joints and ends (Okafor & Ezejindu, 2014). Purslane has an amazing characteristic features. The yellow flowers have five regular parts and are up to 6 mm wide. Depending upon rainfall, the flowers appear at any time during the year. The flowers open singly at the center of the leaf cluster for only a few hours on sunny mornings. Seeds are formed in a tiny pod, which opens when the seeds are mature. It has a taproot with fibrous secondary roots and is able to tolerate poor, compacted soils and drought (Sallam and Anwar, 2015).

The plant belongs to division Magnoliophyta, class magnoliopsida, subclass caryophyllidae, order Caryophyllales. Its family, genus and species are Portulacaceae, *Potulaca* and *oleracea*, respectively (Shazia *et al.*, 2016). The Botanical classification of purslane is given as: Kingdom: Plantae, Order: Caryophyllales, Family: Portulacacaceae Genus: Portulaca, Species: P. oleracea (Simopoulos and Norman, 2017).The Whole young plants, and especially young leaves and tender stem tips of purslane can be used as a potherb, or eaten raw in salads. The taste of purslane is somewhat like watercress and spinach (Hanan *et al*., 2014). Purslane is identified as an excellent source of omega-3 fatty acids, anti- oxidant, vitamins and essential amino acids. Omega- 3 fatty acids are essential for normal growth and development and may play an important role in the prevention and treatment of coronary artery disease, hypertension, diabetes, arthritis, other inflammatory and autoimmune disorders and cancer (Trupti *et al.*, 2018**)**.

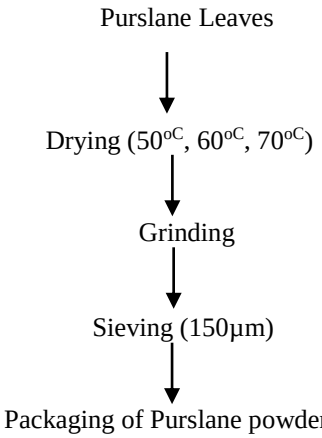
The plant is traditionally used as anti-rheumatic and anti-fungal **(**Ebtesam *et al*., 2015**).** It is listed by the World Health Organization as one of the most used medicinal plants and it has been given the term Global Panacea (World-wide all healing plant). This plant is also pharmacologically studied for its anti-fungal, anti-oxidant, anti-microbial, anti-inflammatory, anti-diabetic, diuretic, analgesic and wound healing properties **(**Ebtesam *et al*., 2015**).** It has been described as a Power Food of the future because of its high nutritive and high antioxidant properties (Akshay *eta al*., 2017).From the point of view of traditional medicine, the nature of purslane is cold and wet, astringent and diuretic, bile anodyne that relieves temperature of blood, liver and stomach. It is useful in the elimination of headaches, thirst relief, stoppage of bleeding, crushing of bladder stones and reduction of coughing and irritation of urethra, bladder, intestines, and hemorrhoids and used as a health food for patients with cardiovascular diseases (Khaled and Sayed, 2014). The Secondary metabolites such as alkaloids, anthraquinone glycoside, cardiac glycoside, coumarins, flavonoids, polysaccharides, fatty acids, terpenoids, sterols, and omega-3- fatty acids are present in relatively good proportion. Omega-3- fatty acids help in preventing heart attacks and have a vital role in strengthening the immune system (Ebtesam *et al*., 2015, Durgesh & Tumane, 2014**)**.The aim of this study is to assess the bioactive constituents of *P. oleracea* leaves grown within Adamawa State University, Mubi such as phytochemical constituents such as Flavonoid, Alkaloids, Saponins, Steroids, Terpenoids, Tannins, Phlobatanins, and Anthraquinones of *P. oleracea* leaves in addition to the vitamin composition of the *P. oleracea* Leaves.

II. METHODOLOGY

The study was carried out in Adamawa State University, Mubi, Adamawa State, Nigeria. Mubi is located between latitudes 10°16'N of the equator and longitudes 13°16' E of the Greenwich meridian and has an elevation of 1906 feet above the sea level. The area falls under the Sudan savanna belt of Nigeria's vegetation. Mubi has a land mass of about 3,871km^2 with a population of 1,239,845 people. Random sampling technique was employed to collect all the samples from different locations within the study area.

Materials/Reagents : Test tubes, measuring cylinder, volumetric flask, oven, water bath, Beaker/conical glass, Filter paper, Buchner funnels, drying-oven and desiccator, Analytical balance, 0.0001g or 0.00001g sensitivity, Blender (warring blender with 1 litre container), Centrifuge, min 4 × 100 ml tubes and 4000 rpm operating speed. Reagents are Sulphuric acid conc. 90%, Distilled water, 0.1% iron (iii) chloride, 1% ammonia solution, 1% Hdrochloric acid, Olive oil, Methanol, ethanol, hydrochloric acid (HCl), Distilled water, ferric chloride, Ascorbic acid (vitamin C), sodium phosphate, ammonium molybdate, Sulphuric acid, potassium dihydrogen phosphate, dipotassium hydrogen phosphate, n-butanol, ferrous chloride, ceric sulphate, ammonia, Draggendroff's reagent, chloroform, aluminium chloride, olive oil and hydrogen peroxide.

Sample preparation : The fresh *portulaca oleracea* plant was washed thoroughly with tap water immediately it was brought to the laboratory, then blended with water (2kg of plant: 1-liter of water) in warring blender and filtered from tuff fibers, packed in polyethylene pouches and then stored till analysis. The *portulaca oleracea* plant was dried in a hot air oven at 60℃, then grinded, packed in polyethylene pouches and stored at ambient temperature for analysis. Drying process of purslane powder carried out at 60 ˚C for 10 hours was selected because of acceptable appearance.



Extraction and Phytochemical Determination: Chemical tests were carried out on the aqueous or ethanolic extract and the powered prepared sample using standard procedures to identify the constituents (terpenoids, tannins, flavonoids, saponins, phlobatanins, alkaloids and others). The powdered plant materials (100g) was

packed into a soxhlet apparatus and extracted exhaustively with 500ml of absolute ethanol for 8 hours. The ethanol was evaporated using a water bath (GFL, Germany) at 40^{oC} for 2 hours and then left overnight at laboratory temperature for evaporation of the remaining ethanol. This yielded semi-solid extract that was then used for the analyses. The aqueous or ethanolic extract obtained was subjected to qualitative tests for identification of different constituents like tannins, alkaloids, saponins, glycosides, phenolic, flavonoids, carbohydrates, proteins and steroids. This was done by using simple and standard qualitative methods as described by Chindo *et al*., (2014).

III. RESULTS AND DISCUSSION

Results : This study revealed the presence of medicinally active phytoconstituents in ethanolic extract of *P. Oleracea* plant sample summarized in tables 4.1. The qualitative estimation saw the presence of alkaloid, saponin, tannin, flavonoid, cardiac glycoside, terpenoids, phlobatanins, protein and starch saponin, tannins, starch and protein as the major constituents.

Table 1: Results for ethanolic extract of *P. Oleracea* Leaves

Phytochemical	Quantity
Flavonoids	++
Alkaloids	++
Saponins	+++
Steroids	+
Terpenoids	++
Tannins	+++
Phlobatanins	++
Anthraquinones	++
Starch	+++
Cardiac glycoside	++
Protein	+++

Key: + Present (trace amount), ++ Abundant, +++ Very abundant

The medicinal value of plants is due to the presence of particular chemical substances that have a definite physiological action on the living system. The most important of these are alkaloids, Saponins, steroids, phenols, flavonoids, tannins and so on. The phytochemical constituents of *P. oleracea* for aqueous extracts are presented in table 1. The result was read based on the colour formation or disappearance as in the case of flavonoids, phenolic compound and anthraquinones or formation of precipitate as in the case of alkaloid and tannins or frothing production as in the case of Saponins.

Table 2. Result of Aqueous Extract of *P. Oleracea* Leaves

Phytochemical	Quantity
Flavonoids	+
Alkaloids	+
Saponins	++
Steroids	-
Terpenoids	+
Tannins	++
Phlobatanins	+
Anthraquinones	+
Starch	++
Cardiac glycoside	+
Protein	++

Key: - Absent, + Present (trace amount), ++ Abundant, +++ Very abundant

The study from table 2 shows the presence of tannins, saponins, alkaloids, anthraquinones, phlobatanins, flavonoids, starch, protein, cardiac glycoside and terpenoids as the major secondary metabolites present in the plant's leaf sample either in abundant or very abundant measure while there is absence of steroids. The results revealed high concentrations of tannins, starch, protein and saponins but trace amount of flavonoids, alkanoids, phlobatanins, terpenoids, cardiac glycoside and anthraquinones. Terpenoids and phlobatanins found in the plant is against the phytochemical findings of Daisy *et al*., (2003) and Okafor (2014) which proved them absent in aqueous extract of P. *oleracea*. Mohammed and Hussein (2017) reported the presence of steroid in *P. oleracea* aqueous extract as against the result of this present study; this may be differences in species or distribution of the plant.

The presence of saponins may be indicative of the leaves of plant been served as the anti-helminthic and anti-chloristic (Lee *et al*., 2012). It has also reported that saponins have been to enhance nutrient absorption and aid in animal digestion but to some extent toxic to animal (Siva & Somaundaram, 2013) especially cold blooded animals; this agrees with postulation by Akshay *et al*., (2017) that the leaf extract remedy is not given to patients with digestive problems. some of the importance of saponins has been revealed to be possession of antinematicidal, molluscicidal, insecticidal and antioxidant, anti-cancer, aphrodisiac, anti-protozoal, antibiotic, antifungal, antiviral, hepatoprotective, anti-inflammatory and anti-ulcer properties among others (Sushmita, 2018).

IV. CONCLUSION

Generally, the phytochemicals found in leaves of *Portulaca oleracea* were in different concentrations. The results of ethanolic and aqueous extracts of *P. oleracea* indicate the presence of many useful compounds such as flavonoid, alkaloids, saponins, steroids, tannins, phlobatanins, anthraquinones, starch, proteins, cardiac glycoside and terpenoids. *Portulaca oleracea* 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. However further studies should be carried out on this plant in order to isolate, identify, characterize and elucidate the structure of the bioactive compounds and determine their mechanism of action. A comparative study is also necessary to determine the variations in observed phytoconstituents based on distribution In view of the highest quantity of saponins, and tannins present in the leaves, *Portulaca oleracea* could be regarded as underutilized parts in health care delivery, thus, the inclusion of these parts as drug sources is suggested. Solvents used in the extraction contributed to the quantity of some phytochemicals present; hence, ethanol extract of this plant is preferable for extraction of Saponin, tannin and steroids. The phytoconstituents observed in this study shows the plant's potency for use in producing pharmaceutical bioactive compounds for therapeutic drugs. However further studies should be carried out on this plant in order to isolate, identify, characterize and elucidate the structure of the bioactive compounds and determine their mechanism of action. A comparative study is also necessary to determine the variations in observed phytoconstituents based on distribution.

REFERENCES

1. Akshay, W; Faiyaz, K. S and Sanjay N. H. (2017). Detection and Comparative Analysis of Amylase Activity from Leaves, Seeds and Stem of Purslane (Portulacaoleracea). International Journal of Advance Research in Science and Engineering .6(9) 123-127.
2. Chinelo, A. E, Ikeh, C.F, Chinyere, Z. I, Bibian, O.A, Ogochukwu, E.O, Mbaekwe, E.I (2014). Comparative determination of phytochemical, proximate and mineral compositions in various parts of Portulaca oleracea L. Journal of Plant Sciences.; 2(6): 293-298
3. Daisy. L., Purwiyatno, H. and Hanny, W. (2003). The Potency of Krokot (Portulaca oleracea) as Functional Food Ingredients, indonesian rood and Nutrition Progress. Vol. 10 no. I
4. Durgesh D. W.and Tumane P.M. (2014). Preliminary phytochemical screening and evaluation of antibacterial activity of portulaca oleracea l. Against multiple drug resistant (MDR) pathogens isolated from clinical specimen. World journal of pharmaceutical research, 3(10) 920-931.
5. Ebtesam, S. A; Nida, N.F, Mai, M. A, Javed; Abdulaziz, A.A and Maqsood, A. S (2015). Portulaca oleracea Seed Oil Exerts Cytotoxic Effects on Human Liver Cancer (HepG2) and Human Lung Cancer (A-549) Cell Lines**.** Asian Pac Journal Cancer Prevention, 16 (8), 3383-3387
6. Hanan, A. A; Sobhy, M.H.; Kawkab, A. A; Azza K. A; Zeinab A. R. and Wedad A. H. (2014). Chemical and remedial effects of purslane (portulaca oleracea) plant, Life Science Journal;11(6)
7. Kamal, M. d, Abdul, S. J, Eaqub, A. M. and Mohd, R. I. (2014). Evaluation of Antioxidant Properties and Mineral Composition of Purslane (Portulaca oleracea) at Different Growth Stages. Int. J. Mol. Sci; 13:10257-10267.

8. Khalid, M. Y. and Sayeed, M. M. (2014). Effects of drying method on the Antioxidantcapacity, Phytochemicals of Portulacea L. leaves. Journal of Nutrition oand Food Sciences. 4(6): 1000322
9. Lee, A.S; Kim, J.S; Lee, Y.J; Kang, D.G. and Lee, H.S. (2012). Anti-TNF-α activity of Portulaca oleracea in vascular endothelial cells. International Journal of Molecular Sciences, 13(12): 5628–5644.
10. Mohamed, A. I. and Hussein A. S. (2017). "Chemical composition of purslane (Portulaca oleracea)," Plant Foods for Human Nutrition, vol. 45, no. 1, pp. 1–9, 2017
11. Oliveira, P., Valentão, R., Lopes, P. B., Andrade, A., Bento, and Pereira, J. A. (2018). "Phytochemical characterization and radical scavenging activity of Portulaca oleraceae L. leaves and stems," Microchemical Journal, vol. 92, no. 2, pp. 129–134, 2018
12. Okafor, I. A. and Ezejindu, D. N. (2014). Phytochemical studies on portulaca oleracea (purslane) plant. global journal of biology, agriculture and health service., 3(1):132-136
13. Sallam E.M. and Anwar M.M. (2015). Utilization of Portulaca Oleracea L. to Improve Quality of Yoghurt; Plant Research Department, Nuclear Research Center, Atomic Energy Authority, Inshas, 13759, Egypt.
14. Siva, R and Somaundaram, G (2013). Acute toxicological evaluation of pet – ether extract of portulaca oleracea (linn.) On rodents. International journal of medical research and health sciences.
15. Shazia, S., Nudrat, F and Ghazala, K. (2016). Portulaca oleracea l.: a mini review on photochemistry and pharmacology. Int. J. Biol. Biotech., 13 (4): 637-641
16. Simopoulos, A. P, Norman, H. A. and Gillaspy, J. E. (2017). "Purslane in human nutrition and its potential for world agriculture," World Review of Nutrition and Dietetics, vol. 77, pp. 47–74.
17. Sushmita N. (2018). Quantitative phytochemical analysis of Portulaca oleracea Linn. growing in unpolluted and polluted area. The Pharma Innovation Journal 2018; 7(5): 619-621
18. Syed S, Fatima N & Kabeer, G (2016). Portulaca oleracea L.: A mini review on phytochemistry and pharmacology, International Journal of Biology and Biotechnology; 13(4):637-641.
19. Trupti. P, d, chitra. C. K, and pratik p. D (2018). Phytochemical analysis of portulaca oleracea and portulaca quadrifida extracts using gas chromatography–mass spectrometry; Asian journal of pharmaceutical and clinical research. 11, (9).
20. Vincenzo, S., Monica, R. L., Rosa, T., Antonio, M &Teresa, M.P (2018). Portulaca oleracea L. (Purslane) extracts display antioxidant and hypoglycaemic effects. Journal of Applied Botany and Food Quality, 91:39 – 46
21. Saliha Rizvi, Syed T. Raza,* Faizal Ahmed, Absar Ahmad, Shania Abbas, and Farzana Mahd (2014). The Role of Vitamin E in Human Health and Some Diseases. Sultan Qaboos Univ Med J. 14(2): e157–e165.