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Effect of Different Method on Processing and Mineral Composition of *Portulaca Oleracea* Leaves

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ABSTRACT

In the present scenario, people consume plant substances not only for the satisfaction of hunger or to fulfill the nutrients requirement to maintain the body processes but also to obtain those substances which help to endorse health by reducing the risk of disease. Green leafy vegetables (GLV) have been the mainstay of human diet as a source of micronutrients and gives an important contribution in combating micronutrient malnutrition in addition of food security as compared to conventional cultivated other vegetables (Flyman and Afolyan, 2006). Judicious use of GLV on a regular basis can replace or reduce the use of expensive medicines and supplements to maintain the health of individuals.

KEYWORDS: *Different Method of Processing, Portulaca oleracea Leaves, Nutritional potential and Mineral Composition*

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INTRODUCTION

India belongs to one of the richest vegetations of the world as India has a wide range of climate condition and environment. Thousands of plants were recorded and used for the treatment of various syndromes in India since ancient time. Rajeshkaran (2002) stated that "India is the Botanical garden of the world". But knowledge of the medicinal and nutritive value of plants have only been found limited to the people where they grow. Since time immemorial, human beings have been in search of a plant with Therapeutic potentials. Folk medicines always play a key role in the treatment for various diseases in rural and tribal areas. Today's modern health science also has shown interest in these plants due to their safe, effective and inexpensive nature and would be source of future remedies for the treatment of various types of diseases.

In this consideration, Kulfa is a wise selection due to its soaring nutritive and antioxidant profile for human as a food substance with medicinal potential. It is herbaceous succulent annual plant and takes an important part in the life of indigenous people where it grows easily. It could be found all over the world in the temperate and tropical area and is approved as herb in several regions of Europe, Asia, Mediterranean region. The botanical name of kulfa is *Portulaca oleracea.* It belongs to the *Portulacaceae* family and is one of the imperative green leafy vegetable which serves as a single remedy for all health problems. In this regard 'Global Panacea' term has been given by the World Health Organization (Dweck., 2001). The presence of phytochemicals in *P. oleracea* contributes to protective health effects in human being. It encompasses superior nutrition worth than other vegetables because of its omega -3 fatty acid, beta carotene (Levy Y et al., 2000), glutathione, ascorbic acid, and alfa tocopherol. Rich source of omega-3 fatty acid is helpful in prevention of heart diseases and boosting the immune system (Simopoulos, 2004). Some researchers reported that the high oxalate content in *PO* leaves may develop kidney stones (Gonnella et al., 2005). Appropriate processing techniques can reduce oxalate up to a safe limit in food stuffs. *PO* leaves are seasonal and highly perishable and it is very susceptible to microbial spoilage. Therefore there is a need to preserve them to retain nutrients through convenient processing technique. Drying and blanching are the most convenient and easy methods for preservation of *P. oleracea*, especially when they are abundantly available and it can be the precious sources of nutrients throughout the year especially for rural folks. It can be used as a supplement of minerals, vitamins, fibers, proteins and other nutrients which are generally present in limited amount in regular diet (Singh et al. 2005). Therefore, the present study will be undertaken to explore possibilities of using the leaves of *PO* to enrich the various traditional food items to cure deficiency disease.

Nutritional potential of *Portulaca oleracea*

Portulaca oleracea is very high nutritional potential as compared to other conventional green leafy vegetables. *PO* is low calories and rich in dietary fiber, and minerals. *PO* helps to prevent chronic diseases such as diabetes, and cardiovascular diseases. It is also richest source of β-carotene. (Sankhala *et al.,* 2005). This leaves also a wealthy source of calcium (Khanal*et al.,* 2010), some B-complex vitamins. (Simopoulos*et al.,* 2004).

In 2002, a patent was granted for the novel utilization PO mostly in treatment of medical sickness. Polysaccharides have a variety of pharmacological effects, including anti-inflammation and anticancer, capabilities (Chen et al., 2009).

Food processing is the technique which converts raw food items into properly cooked and preserved eatable with change in flavor, texture, appearance as well as nutrient concentration and bio arability of bioactive compound. The positive and the negative effects depend on the type of processing techniques used. *PO* is a potential source of nutrient and bioactive compound therefore, the ethnobotanical use of the leaf as vegetable in various food preparations should be encouraged which would be beneficial for prevention and treatment of diabetes, hypertension and cardiovascular diseases (Song Y et al., 2005). In order to determine whether this plant actually holds above-mentioned characteristics after processing, it is essential to examine phytochemical, antioxidants and nutrient potentials of *PO* leaves with utilization exploration as nourishing and therapeutic agent.

Materials and Methods

To extract dirt, dust, and other contaminants, the *PO* leaves were washed and cleaned with plain water. After that, it was dry on filter paper to clear the water. The florets (edible part) of each *PO* leaf were kept for other research, while the non-safe to eat portion, which included the upper stem, and leaf was discarded.

The *Portulaca oleracea* samples were placed in flat dishes and sun dried for three days to extract moisture. After that, dried *PO* samples were placed in transparent polyethylene bags and labeled until they were evaluated further.

Drying in a hot oven is an alternative to traditional drying methods. It is faster, more uniforms, more energy effective, more space efficient, prevents food decomposition, and appears to have a high potential for the processing of agricultural products (Khanal et al., 2010). The high penetration potential of these waves, which heat not only on the surface but also within the food, has sparked a lot of interest in this technology. This will help to speed up the drying process and increase the final product consistency.

Water blanching is carried out until the peroxide is fully inactivated, resulting in overheating and undesirable consistency losses. Blanching fresh leaves is difficult due to the circular shape of the leaves, which makes it difficult to achieve an effective temperature in the centre of the produce and ensure complete enzymatic removal. The acceptability of blanching is influenced by temperature, length, and methods (Obied et al. 2003). The effect of temperature on blanching of different crops was studies, moisture 12.07, ash 30.53, protein 19.74, crude fibre 13.85, fat 6.55 and carbohydrate 55.96.

Fresh *PO* L. were harvested from private fields (Muzarffar Nagar U.P) prior to flowering period during August 2019. *PO* leaves were manually removed from the plant, washed in water, drained, and dried on a cheese cloth at room temperature (35 2°C) for 15 minutes. The AOAC (2005) basic methods for proximate analysis were used. To determine moisture, a representative 10 g of drained leaves was dried in an oven at 105 °C until a constant weight was obtained. The content of ash a dried powdered sample (5g) was determined by incineration at 550°C for 12 hours in a muffle furnace (Dry ashing method). The Kjeldahl method was used to calculate crude proteins. By multiply the evaluated nitrogen by 6.25, total proteins were determined. Crude fibres were digested with 0.25 sulphuric acid and 0.3 sodium hydroxide solution, producing 2 g of dried powdered sample. The resulting insoluble residue was washed with hot water and dried at 100°C until it reached a constant weight. After that, the dried residue was incinerated and weighed to determine the crude fibre content. The formula was used to measure the carbohydrate content and meaning. Carbohydrates: 100% (moisture + proteins + lipids + ash + fibres) the contents of ash, fiber, protein, lipid, and carbohydrate were calculated on a dry matter basis.

Fresh leaves and dried powder samples of seven different types of *PO* L were examined for proximate and composition, moisture, ash, protein, crude fiber, fat carbohydrate, iron, calcium, and magnesium.

Results:

The results of proximate analysis were shown in table 1.

Table 1: Effect of different drying methods on proximate composition (mg/100g) of *Portulaca oleracea* leaves

proximate	Moisture (%)	Ash (%)	Protein (%)	Crude fibre (%)	Fat (%)	CHO (%)
Raw	8.82±0.113	13.71±0.042	17.53±0.106	15.91±0.014	1.63±0.014	42.41±0.262
Sun drying	8.81±0.110	12.63±0.031	16.41±0.113	15.69±0.023	1.39±0.016	45.41±0.251
Hot oven drying	7.61±0.107	12.42±0.045	14.76±0.109	13.74±0.014	1.25±0.011	40.10±0.241
Water blanching+sun drying	7.78±0.111	11.59±0.038	19.74±0.112	13.85±0.026	1.48±0.012	35.96±0.130
Water blanching+hot oven drying	8.61±0.101	13.83±0.051	19.56±0.108	14.40±0.023	1.61±0.010	48.76±0.231
Steam blanching+sun drying	7.63±0.121	13.31±0.031	18.65±0.117	16.87±0.014	1.59±0.011	46.70±0.141
Steam blanching+hot oven drying	7.72±0.115	13.49±0.029	16.95±0.111	14.68±0.015	1.66±0.013	38.96±0.031

The fresh sample was the highest moisture content (90.62 %), follow by the open sun drying sample (13.27 %), and the dehydrated sample was the lowest moisture content (9.99 %). The results were highly significant at (0.01) with the different drying methods. The highest moisture (8.820.113) ash was observed in the dry sample, followed by the open sun drying sample at (8.81±0.110). The results showed that the highest mean value (45.41±0.251) CHO was recorded in the dry sample, while the open sun drying sample ranked 2_{nd} (38.37%), and the fresh sample of *PO* had the lowest mean value (4.42%). The dehydrated sample contained the most protein (18.06 %), followed by the open sun drying sample (18.34%). The fresh sample was the lowest protein (%) value of *PO* (1.98%), and the results were significant ($P<0.01$). The highest fat (%) of PO (2.24%) was record in dry sample, after that by open sun drying sample that stood at (2.16%). The lowest mean value (0.23%) observed in fresh sample. The differences amongst treatments were statistically significant, the results from dehydrated samples were statistically significantly different ($P<0.01$).

Table2. Shows the mineral compositions of fresh and dried *PO* leaves.

Table 2: Effect of different drying methods on mineral composition (mg/100g) of *Portulaca oleracea* leaves

Mineral	iron	Calcium	Magnesium
Raw	3.79±0.014	183.63±0.247	124.77±0.042
Sun drying	3.65±0.012	174.49±0.238	125.79±0.043
Hot oven drying	3.41±0.010	169.35±0.198	123.21±0.036
Water blanching+sun drying	3.75±0.011	181.62±0.243	124.61±0.040
Water blanching+hot oven drying	3.55±0.015	179.41±0.231	124.66±0.032
Steam blanching+sun drying	3.63±0.012	168.21±0.011	123.41±0.029
Steam blanching+hot oven drying	3.41±0.011	163.20±0.010	123.21±0.019

The calcium content of *PO* was highest in dehydrated samples (385.03 mg/100 g), open sun drying samples (380.64 mg/100 g). The calcium content of the fresh sample (41.16mg/100 g) was measured. As compared to the fresh sample, the results from dry samples were statistically significant ($P<0.01$). The magnesium content of a dehydrated *PO* sample was found to be highly significant (117.87mg/100g).

The dehydrated *PO* sample was found to have significant iron content (27.22 mg/100 g), while the open sun drying sample came in second (26.22 mg/100 g), with the fresh sample having the lowest mean value (2.38 mg/100 g).

Discussion

According to this study, *portulaca oleracea* has high moisture content (90.62 %). Moisture (%) is a commonly used parameter in food processing and testing. Similarly, (G.-Y. Zheng et al., 2014) reported similar findings. Because Portulaca oleracea waste is high in proteins and minerals, the various drying processes would have a direct impact on nutrient accessibility for the growth of fungus and subsequent enzyme production. In the current study, we also discovered low mineral values, particularly iron, as a result of different drying methods.

Conclusion

In conclusion, our findings show that *portulaca oleracea* is a good source of dietary fiber, and calcium. Sun-drying was also found to be very effective in preserving the chemical composition of *portulaca oleracea* as well as preventing deterioration by reducing moisture.

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