REPORT

Nutrient evaluation and elemental analysis of four selected medicinal plants of soon valley Khushab, Punjab, Pakistan

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Abstract: To check the nutritional and mineral contents of four medicinal plants viz., Peganum hermla, Solanum nigrum, Mentha longifolia, Achryanthus aspera, which are used as medicine traditionally in Soon Valley Khushab, Pakistan. Proximate analysis of plant sample determined that protein (7.491%) and ash (22.79%) was highest in Mentha longifolia, carbohydrate (75.23%) in Peganum hermla, fats (12.595%) and moisture (6.82%) was highest in Achryanthus aspera. In comparative assessment of the various species, the results showed that Achryanthus aspera. is the most significant species having higher concentrations of fat, fibre values compared to the other species. Absorption Spectrometric method was used for the elemental analysis of essential elements such as Fe, Cd, Cu,Mn, Pb, Cr, Ni and Na in medicinal plants in different range.

Keywords: Nutrients, Elemental, Evaluation, Medicinal Plants, Soon valley khushab

INTRODUCTION

For primary health care needs, world 80% population relies mainly on plant based traditional medicines because according to them, medicinal plants are natural or near to nature are always safe. The important values of some plants have long been published but a large number of them remain unexplored as yet. So there is a necessity to explore their uses and to conduct pharmacognostic and pharmacological studies to ascertain their therapeutic properties.

In Pakistan, more than 1,000 medicinal plant species have been reported to have therapeutic properties and medicinal values which are used against many diseases (Latif et al., 2004; Mushtaq et al., 2009). In Pakistan, 60% of the population, especially in villages is getting health care by Hakims, who use these herbal medicines to cure many diseases (Haq, 1983). Each medicinal plant species has its own nutritional composition. These nutrients include carbohydrates, fats and protein and play an important role in satisfying human needs for energy and life process (Hoffman et al., 1998. Shinwari et al., 2006) reported that more than 1000 plants species have medicinal values. These medicinal plants are used by the marginal communities to cure various diseases (Latif et al., 2004; Adnan and Holscher, 2010).

For proximate and nutrient analysis, Peganum hermala, Solanum nigrum, Mentha longifolia and Achryanthus aspera were collected.Important macronutrients such as nitrogen and potassium play an important role in soil with low moisture content. They compensate the effect of drought and increased dry matter production of some fodder species such as maize and sorghum (Mirza et al., 1998).

According to the WHO, 80% of the world’s people rely on traditional medicine for their primary health care needs. There are considerable benefits in the use of medicinal plants for the treatment of various diseases (Azaizeh et al., 2003).

Lovkova et al., (2001) examined the chemical features of medicinal plants and reviewed the data on chemical composition related to the synthesis of physiological active substances and to the accumulation of individual elements. Chemical features of medicinal plants serve as determination of their species specificity and pharmacological properties and enable their wide use medicinal practices. Peganum hermala belonging to the Family Nitraceae is a perennial herb frequently woody whose flowers are dioecious (Hussein M. Alwadie, 2005).

Mentha longifolia is a medicinal plant which is used for anti-rheumatic, stomachic, carminative, tonsillitis, diarrhea and dysentery belonging to the family Lamiaceae. The parts of the plant that are mostly used are the leaves, but sometimes the stems and rhizomes are used in traditional potions (van Wyk et al., 1997). Medicinally, milk or water decoctions of wild mint are mainly used for coughs, colds, asthma (Watt and Breyer-Brandwijk, 1962). Decoctions have also been used to treat headaches, fevers, indigestion, flatulence, hysteria, painful menstruation, delayed pregnancy and urinary tract
infections (van Wyk et al., 1997). Mentha longifolia is used to treat colds, stomach cramps, asthma, flatulence, indigestion, muscle spasm, whooping cough, hemorrhoids and skin ulcer. It is also used for the cure of rheumatism and other painful infections (Babu et al., 2002).

The frequently used parts of Mentha spp. are Leaves, flowers and stems in herbal medicines and also used in many foods for its aroma or as in commercial spice (Kothari and Singh, 1995; Moreno et al., 2002). The essential oil extracted from M. longifolia showed a strong antimicrobial activity against 30 microorganisms including Gram-positive and Gram-negative bacteria yeast (Candida albicans) and fungi Guilleu et al. (2007).

Achyranthus aspera is a perennial herb belonging to the family Amaranthaceae. The biological activities such as antilipidemic, antiplatelet, cytotoxicity and phytotoxicity was showed by the various crude fractions of this plant (Hussain et al., 2010). Peganum hermla is diuretic and demulcent, effective in lithiasis, headache and removes inflammation.

The nutritional significance can be assessed by proximate and nutrient analysis of edible fruit and vegetables which plays a crucial role in assessing their nutritional significance. The worth of these plants species can evaluate their nutritional significance, as many of these medicinal plant species are also used as food along with their medicinal benefits. For this purpose, four medicinal plants species were analyzed to evaluate their nutritional value and mineral contents.

MATERIALS AND METHODS

Plants collection & Sample preparation

Four plant species were collected from soon valley Khushab and its vicinities. Herbarium sheets were prepared of these plants. These plants were identified and classified by a plant taxonomist of Department of Biological Sciences, University of Sargodha. For 10 days these plants were dried in air and then ground into a very fine powder and stored in air tight plastic bags for further analysis.

Proximate analysis

For proximate analysis of the samples for moisture, total ash, crude fiber, crude fats, proteins and carbohydrates AOAC methods were applied (Anonymous 1990). Weight difference method was used for the moisture and ash (Haro et al., 1968; Boussama et al., 1999 and Das et al., 1997). The micro Kjeldahl method was used for determination of proteins in which digestions, distillation and titration of the sample is done (Pearson, 1976). The value of nitrogen was converted to protein by multiplying to a factor of 6.25. The solvent extraction method was used for lipid content of the samples. The petroleum ether (boiling range 40-60°C) solvent was used (The total carbohydrates were determined by difference method [100-(proteins+ fats+ moisture +ash in percentage)] (Muller et al., 1980). All the proximate values were reported in percentage (Hussain et al., 2009a, b and 2010a, b).

Macro and micronutrient analysis

Atomic Absorption Spectrometer (Perkin Elmer AA Analyst 700) was used for the elemental contents including Mn, Cu, Pb, Cr, Fe, Cd, Na and Mg of the four selected medicinal plant species. The results were obtained while using a working standard of 1000 ppm for each of the species (Hussain et al., 2009a, b and 2010 a, b).

RESULTS

The proximate analysis of these plants shows different concentrations/proportions of biochemical’s and other contents. After drying, it was found that the all species had different moisture contents. It was observed that the overall percentage of moisture contents was found highest in Achyranthus aspera (6.82) followed by, Peganum hermla (6.20%), Solanum nigrum (5.97%) and Mentha longifolia (2.60%). While in case of ash contents, it was highest in Mentha longifolia (12.39%) and Achyranthus aspera. The lowest value of ash was found in Peganum hermla (6.40%) (table 1).

According to the results Mentha longifolia and Solanum nigrum had highest values of protein (7.491%), (6.20%) respectively. While rest of the two plant species had minor values. From carbohydrate analysis, Peganum hermla and Mentha longifolia had highest levels compared to other species (75.23), (55.12) respectively (table 1).

The proximate analysis of the protein contents in the selected four medicinal plant species, showed that Mentha longifolia and Peganum hermla had highest concentration of protein (7.491%) and (4.57%) as compared to other species (table During analysis, fat contents was observed highest in (12.29%) followed by Solanum nigrum (5.34%) and Mentha longifolia (2.34%) (table 1).

The results obtained from the fibre analysis showed that, Peganum hermla had higher concentration of fibre (16.34%) and Mentha longifolia had (11.29%). This was followed by the Solanum nigrum in which its value was found (8.49%). The lowest value of fibre was present in Achyranthus aspera (7.84%) table 1.

Discussion

The result of the following study agrees with earlier study of elemental distribution in medicinal plant species as reported by Kim et al. (1994). The result of the present study shows a high level of macro elements accumulation...
Table 1: Proximate analysis of four selected medicinal plants species

<table>
<thead>
<tr>
<th>Species name</th>
<th>Moisture%</th>
<th>Ash %</th>
<th>Protein %</th>
<th>Fat%</th>
<th>Carbohydrates%</th>
<th>Fibre %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peganum hermla</td>
<td>6.20±0.01</td>
<td>3.68±0.002</td>
<td>4.57±0.02</td>
<td>1.60±0.01</td>
<td>75.23±0.03</td>
<td>16.34±0.02</td>
</tr>
<tr>
<td>Mentha longifolia</td>
<td>2.60±0.02</td>
<td>22.39±0.02</td>
<td>7.49±0.02</td>
<td>2.34±0.02</td>
<td>55.12±0.04</td>
<td>11.29±0.03</td>
</tr>
<tr>
<td>Solanum nigrum</td>
<td>5.97±0.07</td>
<td>6.40±0.015</td>
<td>6.20±0.03</td>
<td>5.34±0.02</td>
<td>70.29±0.07</td>
<td>8.49±0.02</td>
</tr>
<tr>
<td>Achryanthus aspera</td>
<td>6.82±0.06</td>
<td>10.11±0.03</td>
<td>4.19±0.04</td>
<td>12.29±0.03</td>
<td>41.34±0.11</td>
<td>7.84±0.01</td>
</tr>
</tbody>
</table>

Table 2: Elemental analysis of four selected medicinal plants species

<table>
<thead>
<tr>
<th>Species name</th>
<th>Cu (ppm)</th>
<th>Mn (ppm)</th>
<th>Pb (ppm)</th>
<th>Cd (ppm)</th>
<th>Fe (ppm)</th>
<th>Cr (ppm)</th>
<th>Ni (ppm)</th>
<th>Na (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peganum hermla</td>
<td>3±0.002</td>
<td>29±0.003</td>
<td>1.97</td>
<td>0.67±0.002</td>
<td>15.6±0.03</td>
<td>40.0±0.04</td>
<td>23±0.03</td>
<td>71.0±0.05</td>
</tr>
<tr>
<td>Mentha longifolia</td>
<td>6±0.004</td>
<td>42±0.001</td>
<td>9±0.03</td>
<td>0.70±0.003</td>
<td>53.4±0.05</td>
<td>39.0±0.05</td>
<td>22±0.005</td>
<td>29.9±0.9</td>
</tr>
<tr>
<td>Solanum nigrum</td>
<td>7±0.003</td>
<td>31±0.005</td>
<td>13±0.01</td>
<td>0.35±0.001</td>
<td>42.0±0.03</td>
<td>45.0±0.002</td>
<td>30.0±0.3</td>
<td>32.5±0.06</td>
</tr>
<tr>
<td>Achryanthus aspera</td>
<td>8±0.004</td>
<td>43.0±0.002</td>
<td>8±0.02</td>
<td>0.69±0.003</td>
<td>34.5±0.09</td>
<td>51.0±0.2</td>
<td>23.0±0.003</td>
<td>27.6±0.3</td>
</tr>
</tbody>
</table>

in the sampled plants except in very few cases the mean concentration is very low. It is important to emphasize that the best benefit to human health depends on some plants species used in homeopathic system has been traced to the presence of Ca, Cr, Fe, Mn, Ca, K and Zn in plants (Perman et al. 1993). Elements equally contribute to neurochemical transmission which are food constituents of biological molecules.

**Elemental analysis**

The mineral composition results of the four medicinal plants show that these plants contains rich source of mineral elements, this result become so important when the usefulness of such mineral like Ca, Mg, P, K and Na in the body are considered. However, the lower Na content (0.1 g) is an added advantage because of the direct relationship of sodium intake with hypertension in human (Dahl, 1972). The elemental analysis of the medicinal plant species showed significant variation among different elements (table 2). In case of Fe, it was found that the Mentha longifolia had the highest Fe contents (53.4ppm), followed by the Solanum nigrum (420ppm), Achryanthus aspera (34.5 ppm) and Peganum hermla (15.6ppm). Higher concentration level of Cu was present in Achryanthus aspera (8ppm) and the Peganum hermla had the lowest value (1.97 ppm). In case of Ni, the maximum value of Ni was observed in Solanum nigrum (30ppm) and Mentha longifolia had the minimum concentration of Ni (22ppm).

**CONCLUSION**

In recent years, use of medicinal plants and conservation has taken considerable amount of importance. It was used globally by the indigenous and marginal communities for curing various diseases. These medicinal plant species are mostly used as food supplement along with its oral decoctions. However, little have been done so far to verify the uses in this regard. The present research is an effort in doing so.

Our current study on nutritional evaluation of Peganum hermla, Solanum nigrum, Mentha longifolia and Achryanthus aspera have revealed that these plants are good source of nutrients (moisture, ash, proteins, fats, carbohydrates, fiber and minerals) and can be used as substrates deficit in either of these nutrients.

**REFERENCES**


Nutrient evaluation and elemental analysis of four selected medicinal plants


