

## Market basket survey of selected dry fruits as a potential source of potassium

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**Abstract:** In order to assess the impact of human activity on the food chain, monitoring of trace metals in a variety of dry fruits being sold in Lahore city has been focus of this study. Trace levels of metals such as Zn, Na, K, Ni, Mn, Al and Se were determined in 05 different varieties of dry fruits purchased from local market of Lahore city of Pakistan. Potassium concentration in *Pistachio* ( $408.16 \pm 0.57 \text{mg}/100 \text{g}$ ) and in *Cashew* ( $252.85 \pm 0.92 \text{mg}/100 \text{g}$ ) were higher as compared to other dried fruit samples. So the *Pistachio* and *Cashew* nuts were rich source of potassium and can be used as supplement in herbal formulation to overcome potassium deficiency.

**Keywords:** Dry fruits, Potassium, *cashew* and *pistachio*.

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### INTRODUCTION

Metals are essential for important biochemical and physiological functions and are necessary for maintaining health throughout life. It is well known that an excess or deficiency of trace metals present in the human body can cause harmful effects. Excess of Cu in human body cause Wilson's disease where as the deficiency of Zn is responsible for retarded body growth<sup>1,2</sup>.

Dry fruits in substantial quantities are essential nutrients in a rational proportion for human body. They have considerably more energy than fresh fruits because the nutrients are concentrated in solids when the water is removed. They are excellent source of minerals, vitamins and enzymes. They are easy to digest and clean the blood and the digestive area. Persons who have this natural diet will always enjoy good health. Also the illness caused by the intake of unnatural foods can be successfully treated by dry fruits. Though nuts and raisins are small in size, amount of power they provide us when consumed make them very big. Fresh and dry fruits are very essential since besides being food for us they also have strong medicinal properties<sup>3</sup>. The under-nutrition is the major public health problem affecting the developing countries. According to Nnamani et al., the World Health Organization (WHO) estimated that 200 million people in Sub-Sahara Africa are affected with chronic under nutrition<sup>4,5</sup>.

Since at the ancient times nuts and dried fruits have been considered as an important human source of food either in from of wild or growing fruit trees. Dry fruits play a vital role in the diet of human beings as these are rich source of different trace metals and nutrients<sup>6</sup>. Among the major edible nuts and dried species, including *Almond* (*Prunus dulcis*), *Walnuts* (*Juglans regia*) *Pistachio* (*Pistacia vera*), *Peanut* (*Arachis hypogaea*) and *Cashew* (*Anacardium*

*occidentale*) are reviewed in connection with their nutritional value and potassium concentration with other important trace metals which are essential for human body.

This study is aimed to present a data of trace levels of metals in different types of Dry fruits available in Lahore city. This study report the nutritional profile of some selected dried fruit, with the hope that it would be found worthy of tackling the problem of under-nutrition in the society. On basis of analysis of different dry fruits it help to identify that which is best diet that provide potential source of Potassium. Dry fruits prevent different type of diseases and keep a person energetic and active all through his life even up to the ripe old age as in Table 1.

### MATERIALS AND METHODS

The selection of dry fruits based on criteria regarding their consumption and their availability. The composite samples of dry fruits were collected from the local market of Lahore city- Pakistan. All dry fruit samples were washed thoroughly and separately. Running tap water was employed to remove dust and ad-hered particles. The samples were later rinsed thrice with de-ionized water and subsequently dried in oven at 60-80°C. After drying and cooling, about 2 g of each dried sample was weighed accurately in cleaned and dried 50ml beaker and digested in 10 ml of 1:3 mixture of concentrated 65%  $\text{HClO}_4$  :  $\text{HNO}_3$  (Merck) using a hotplate, till clear solution was obtained. Digested samples were cooled at room temperature. These were then acidified with 10 ml of 1:1 mixture of  $\text{HCl}:\text{H}_2\text{O}$  and filtered through 0.45 micron filter paper and the volume was made up to 50ml with distilled water<sup>10</sup>. The digested samples were transferred to cleaned dried plastic bottles for chemical analysis by using Atomic Absorption Spectrometry (Perkin Elmer Aanalyst 800).

**Table 1:** Importance of dry fruits in human life.

Common name	Botanical name	Importance
<i>Almond</i>	<i>Prunus dulcis</i>	<i>Almonds</i> are a rich source of vitamin E, dietary fiber, essential minerals and monounsaturated fat. <i>Almonds</i> improved complexion and possibly a lower risk of cancer. Preliminary research associates consumption of <i>Almonds</i> with elevating blood levels of high density lipoproteins and lowering low density lipoproteins <sup>7</sup> .
<i>Cashew</i>	<i>Anacardium occidentale</i>	<i>Cashew</i> nuts contain protein, carbohydrates and are very rich source of minerals. Minerals especially manganese, potassium, copper, iron, magnesium, zinc and selenium are concentrated in the nuts which are important for bones, nerves and muscles.
<i>Peanut</i>	<i>Arachis hypogaea</i>	<i>Peanuts</i> are rich in nutrients, niacin, folate, fiber, magnesium, vitamin E, manganese and phosphorus.
<i>Pistachio (pista)</i>	<i>Pistacia vera</i>	<i>Pistachios</i> rich in potassium concentration and significantly reduced the levels of low-density lipoprotein (LDL cholesterol) in body while increasing antioxidant levels in the serum. <i>Pistachio</i> nut can significantly elevate plasma levels of lutein, alpha-carotene, beta-carotene, and gamma-tocopherol <sup>8</sup> .
<i>Walnut</i>	<i>Juglans regia</i>	Compared to certain other nuts, such as <i>Almonds</i> , <i>Peanuts</i> and hazelnuts, <i>Walnuts</i> contain the highest total level of antioxidants, including both free antioxidants and antioxidants bound to fiber. <i>Walnuts</i> act as a cancer chemopreventive agent, an effect which may be a result of the fruit's high phenolic content, antioxidant activity, and potent in vitro anti-proliferative activity <sup>9</sup> .

**Table 2:** Standard operating conditions for the analysis of heavy metals using atomic absorption spectrometry.

Metals	Wavelength (nm)	Lamp Current (mA)	Flame	Slit Width (mm)
Pb	283.3	12		0.2
Mn	279.5	30		0.7
Cu	324.8	30	Air-	0.2
Co	240.7	30	Acetylene	0.7
Ni	232.0	30		0.2
Zn	213.9	20		0.2

### Quality control

All reagents were of analytical grade and high purity distilled water was used for making all the solutions. For the assurance of Precision and accuracy all dry fruits samples were analyzed in three replicate. Results obtained from the experiments (n=3) are expressed as Mean values±SD (standard deviation).

## RESULTS AND DISCUSSION

Dry fruits are important source of nutrients and offer various advantages over dietary supplements. In our daily diet dry fruits have been strongly associated with reduced risk for some forms of cancer, heart disease, stroke and other chronic ailments<sup>11</sup>. Climatic conditions, particularly temperature and light intensity, have an especially strong effect on the nutritional quality of dry fruits and vegetables oxidation<sup>12</sup>. Although antioxidant capacity varies greatly among dry fruits and vegetables it is better to consume a variety of commodities rather than limiting consumption to a few with the highest antioxidant capacity<sup>13</sup>.

Pakistan has all the natural flavors, usually considered ideal for the production of good quality of dry fruits due to availability of fertile soil, temperature variation and other climatic condition. Pakistani dry fruits are being demanded in almost all over the world. The concentration of the metals in dry fruits depends on soil type, the rootstock used for fruit trees, mulching, irrigation, fertilization and other cultural practices influence the water and nutrient supply to the plant<sup>14</sup>.

Table 3 shows the metal profile of five dry fruits commonly used by local population in Punjab. Clinical and epidemiological studies have reported the beneficial effects of tree nuts and *Peanuts* on serum lipid levels. *Pistachio* nuts contain high caloric value and the lipid for human body<sup>15</sup>. It can be seen that *Pistachio* has least value of Al (0.823mg/100g) and *Peanut* has a high value of it. The concentration of Zn is very high as compared to Al, Ni, Mn and Se, shown in Figure 1.

The concentration of Zn in *Walnut* is (2.94±0.06mg/100g) whereas in *Cashew* (3.3±0.05mg/100g), which is recorded maximum. The concentration of Al was remarkable in *Peanut* and *Walnut* respectively. Concentration of Mn in *Walnut* was (2.32±0.09mg/100g) and *Almond* also contain sufficient amount that is (1.66±0.07mg/100g).

Potassium is necessary for the function of all living cells, and is thus present in all plant and animal tissues. The five dry fruits under investigation are rich in potassium.

**Table 3:** Trace and heavy metals concentration in dry fruits samples mg/100g.

Metal s	Almond mg/100 g	Cashew mg/100 g	Peanut mg/100 g	Pistachio mg/100 g	Walnut mg/100 g
Al	1.92 ±0.02	1.78 ±0.22	3.55 ±0.56	0.82 ±0.12	2.46 ±0.45
Ni	0.18 ±0.12	0.59 ±0.04	0.031 ±0.03	0.042 ±0.01	0.13 ±0.02
Mn	1.66 ±0.07	0.82 ±0.04	0.99 ±0.05	0.79 ±0.03	2.32 ±0.09
Se	0.02 ±0.001	0.001 ±0.001	0.012 ±0.001	0.028 ±0.01	0.031 ±0.001
Zn	2.43 ±0.12	3.3 ±0.05	2.26 ±0.09	1.66 ±0.08	2.94 ±0.06
Na	39.78 ±0.62	36.47 ±0.72	53.98 ±0.82	123.15 ±0.93	57.16 ±0.57
K	236.4 ±1.02	252.85 ±0.92	200.7 ±0.98	408.16 ±0.57	228.62 ±0.67

Maximum potassium concentration was found in *Pistachio* (408.16±0.57mg/100g) and minimum value was found in *Peanut* as (200.7mg/100g) which is depicted in Figure 2. Na concentration was maximum in *Pistachio* (123.15±0.93) and minimum value was found in *Cashew* as shown in Figure 2.

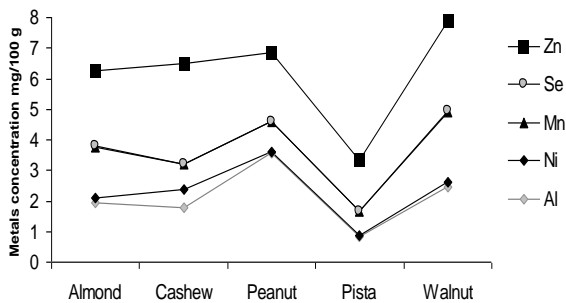
Digestive system may also get affected due to potassium deficiency, thus leading to, chronic sleeplessness, constipation, depression and hypertension<sup>16</sup>. Critically low levels of potassium are known to result in life-threatening conditions such as cardiac arrhythmia, and that makes it all the more important to keep an eye for the potassium level in the body<sup>17</sup>. Prevention is better than cure, and a balanced diet is the key to prevent many diseases. The conclusion of the study shows that *Pistachio* and *Cashew* were rich source of potassium and can be used as supplement and in herbal formulation to overcome potassium deficiency.

### CONCLUSIONS AND RECOMMENDATIONS

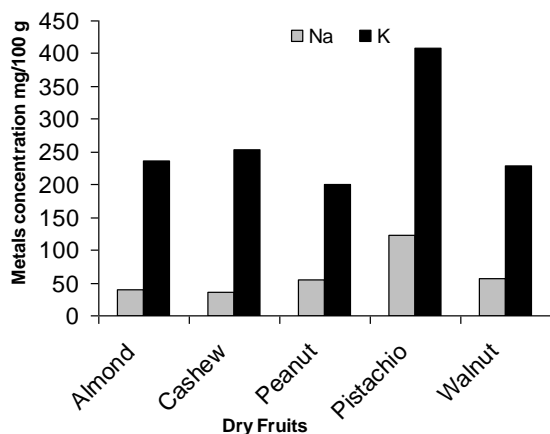
It is concluded that *Pistachio* and other dry fruits were used in our daily diet it would be beneficial to overcome potassium deficiency. These dry fruits were good for the patient which suffering diseases caused by deficiency of potassium. People should be educated to maintain good health by using balance diet.

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**Figure 1:** Metals concentrations in different dry fruits.



**Figure 2:** K and Na concentrations in dry fruits samples.

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