Pak. j. sci. ind. res. Ser. B: biol. sci. 2017 **60**(2) 118-120

Short Communication

Nutritional Analysis and Determination of Antioxidant Activity Using Free Radical Scavenging Assay of Potatoes (*Solanum tuberosum*) from Two Regions of Pakistan

Muhammad Khalid Saeed[a], Ashi Nazir[b], Ijaz Ahmad[a], Naseem Zahra*[a], Alim-un-Nisa[a], Sajila Hina[a] and Imran Kalim[a]

[a]FBRC, PCSIR Laboratories Complex, Ferozepur Road Lahore-54600, Pakistan
[b]Government Islamia College University, Gujranwala, Pakistan

(received August 12, 2015; revised October 16, 2016; accepted December 3, 2016)

Abstract. Present study was designed to evaluate the nutritional values of red skin potatoes collected from Gujranwala and Lahore regions of Pakistan. Potatoes (*Solanum tuberosum*) of Gujranwala and Lahore were found to contain moisture contents of 5.00 and 5.15%, respectively. Fat was 0.19% in *S. tuberosum* of Gujranwala whereas Lahore potatoes were found to contain fat 0.2%. Fibre content of *S. tuberosum* of Gujranwala was 16.47% while *S. tuberosum* of Lahore had 13.45% fibre. Protein contents of *S. tuberosum* of Gujranwala were 12.89% whereas for *S. tuberosum* of Lahore were 13.11%. The water extract showed significant free radical scavenging activities in DPPH radical scavenging antioxidant assay and antioxidant activity was increased in a dose dependent manner. These results suggest that potato (*S. tuberosum*) is not only a cheap source of very important nutritents but also has antioxidant activities which are helpful to maintain different physiological functions of body.

Keywords: potato, nutritional composition, DPPH assay

Potato is starchy tuberous crop; the perennial *Solanum tuberosum* of the Solanaceae family also known as the nightshades. It is best known for its carbohydrate content (approximately 26 g in a medium potato). The predominant form of this carbohydrate is starch. Thus, potato has become high yielding carbohydrate enriched vegetable containing phytochemicals, minerals, vitamin C, polyphenols, carotenoids, selenium and α-tocopherol throughout the world (Aziz *et al*., 2013; Abbasi *et al*., 2011; Sirpa *et al*., 2009; Andre *et al*., 2007; Lachman *et al*., 2006; Kalt, 2005). It is fourth most important food crop worldwide after maize, wheat and rice, with production of more than 323 million tonnes (Aziz *et al*., 2012). The antioxidant content and the antioxidant capacity of both hydrophilic and lipophilic antioxidant extracts from four "early potato" cultivars, grown in two different locations i.e., Racale and Monteroni, Gujranwala and Lahore, Pakistan were examined. There was a considerable variation in carotenoid content and weak differences in the ascorbic acid concentration of the examined cultivars of "early potato" and between the harvested locations. These data can be useful for "early potato" tuber characterisation and suggest that the "early potato" has a potential as a dietary source of antioxidants (Leo *et al*., 2008). On the basis of the results obtained, potato peel, sugar beet pulp and sesame cake extracts could serve as natural antioxidants owing to their significant antioxidant activity. Therefore, they could be used as preservative ingredients in the food and/or pharmaceutical industries (Mohdaly and Sarhan, 2010). In terms of the analyzed parameters, there were no explicit differences among the sweet potato cultivars (Dincer *et al*., 2011). The potato flour can be stored safely for six months, both at room and refrigerated temperatures, without adversely affecting most nutritional components (Anupama and Kalpana, 2011). In the present study, nutritional analysis and antioxidant activity of potatoes collected from two regions were determined.

*Author for correspondence;
E-mail: naseem.zahra1981@gmail.com

Collection of samples. Red skin potato samples were collected from two regions of Pakistan, one from district Gujranwala and other from Lahore and used for present research work. The samples were stored in a polyethylene bags for further analysis.

Proximate analysis. Moisture, ash, crude fat and crude fibre were determined in accordance with AOAC (2012), while nitrogen was determined by the micro-kjeldahl

method and the percentage of nitrogen was converted to crude protein by multiplying by 6.25. Carbohydrate and energy was also calculated.

DPPH radical scavenging activity of potato. DPPH radical scavenging activity of potato extracts was determined using the method described by Huang *et al*. (2005). Sample (1 mL) was mixed with same volume of methanolic DPPH solution (0.0012M). The mixture was kept for 30 min under dark place for the completion of reaction. Free radical scavenging activity of the potato was measured by recording the absorbance of reaction mixture at 517 nm using UV–Vis spectrophotometer (Agilent 8453). Percent inhibition was calculated using the following equation.

Inhibition (%) = [100 × (a blank - a sample) ÷ A blank]

A blank is the absorbance of the all reagents except the test sample and a sample is the absorbance of the test sample (Zahra *et al*., 2015).

The nutritional values of potatoes collected from Gujranwala and Lahore regions are given in Table 1.

Energy value of Gujranwala potatos was 292.08 (Kcal/100 g) where as the energy of potatoes from Lahore was 309.14 (Kcal/100 g) as presented in Fig. 1.

The mean pertaining to DPPH radical scavenging activity exhibited the maximum value (30.40±1.5%) for Gujranwala potatoes region followed by Lahore potatoes region (24.88±1.3%) at concentration 5m/mL as given in Fig. 2.

The present study results can be compared with the earlier findings of Aziz *et al*. (2013). The potato contained appreciable amount of moisture (77.5 to 82.37%), ash (1.46 to 1.66%), crude protein (2.037 to 3.062%), crude fat (1.16 to 1.89%) and crude fibre (2.12 to 2.66%). The study revealed that consumption of the potato can provide nutritional value along with antioxidant potential that might be helpful for appropriate working of the physiological systems of body.

Table 1. Nutritional value of *S. tuberosum*

	Parameters					
	Moisture	Ash	Fat	Fibre	Protein	Carbohydrate
Gujranwala						
Values (%)	5.00	5.74	0.19	16.47	12.89	59.71
Lahore						
Values (%)	5.15	5.38	0.21	13.45	13.11	62.70

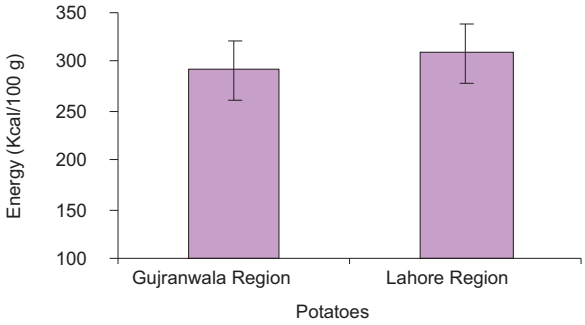

Fig. 1. Energy (Kcal/100 g) of Gujranwala and Lahore region potatoes.

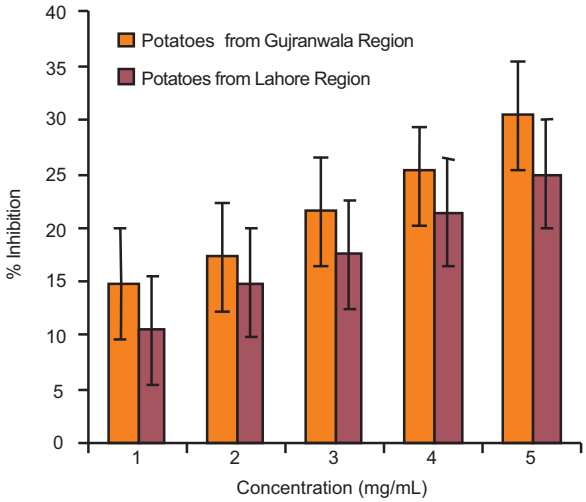

Fig. 2. % Inhibition (DPPH) of Gujranwala and Lahore region potatoes.

Based on nutritional analysis of *Solanum tuberosum*, it is concluded that potatoes of Gujranwala have better values of nutritional values in terms of moister, ash and fibre as compared to variety of Lahore city. Besides Gujranwala potatoes have low value of fat and energy as compared to the Lahore, Pakistan.

References

Abbasi, K.S., Masud, T., Gulfraz, M., Ali, S., Imran, M. 2011. Physicochemical, functional and processing attributes of some potato varieties grown in Pakistan. *African Journal of Biotechnology*, **10:** 19570-19579.

Andre, C., Ghislain, M., Bertin, P., Oufir, M., Herrera, M.D.R., Hoffmann, L., Hausman, J., Larondelle, Y., Evers, D. 2007. Andean potato cultivars (*Solanum*

tuberosum L.) as a source of antioxidant and mineral micronutrients. *Journal of Agriculture Food Chemistry*, **55:** 366-378.

Anupama, M., Kalpana, K. 2011. Effect of storage on nutritional value of potato flour made from three potato varieties. *Plant Foods for Human Nutrition*, **58:** 1-10.

AOAC, 2012. *Officials Method for the Analysis*, 19th edition, Association of Official Analytical Chemists. Arlington, Washington DC, USA.

Aziz, A., Muhammad, Y., Muhammad, A.R., Adeela, Y., Muhammad, A.J., Muhammad, S. 2013. Nutritional and antioxidant profile of some selected Pakistani potato cultivars. *Pakistan Journal of Food Sciences*, **23:** 87-93.

Aziz, A., Randhawa, M.A., Butt, M.S., Asghar, A., Yasin, M., Shibamoto, T. 2012. Glycoalkaloids (α-*Chaconine* and α-*Solanine*) contents of selected Pakistani potato cultivars and their dietary intake assessment. *Journal of Food Science*, **77:** T58-T61.

Dincer, C., Karaoglan, M., Erden, F., Tetik, N., Topuz, A., Ozdemir, F. 2011. Effects of baking and boiling on the nutritional and antioxidant properties of sweet potato (*Ipomoea batatas* L.) Lam., cultivars. *Plant Foods and Human Nutrition*, **66:** 341-347.

Huang, Y.C., Chang, Y.H., Shao, Y.Y. 2005. Effects of genotype and treatment on the antioxidant activity of sweet potato in Taiwan. *Food Chemistry*, **98:** 529-538.

Kalt, W. 2005. Effects of production and processing factors on major fruit and vegetable antioxidants. *Journal of Food Science*, **70:** 11-19.

Lachman, J., Hamouz, K., Cepl, J., Pivec, V.M., Dvorak, P. 2006. The effect of selected factors on polyphenol content and antioxidant activity in potato tubers. *Chemicke Listy*, **100:** 522-527.

Leo, L., Leone, A., Longo, C. 2008. Antioxidant compounds and antioxidant activity in early potatoes. *Journal of Agriculture Food Chemistry*, **56:** 4154-4163.

Mohdaly, A.A., Sarhan, M.A. 2010. Antioxidant properties of various solvent extracts of potato peel, sugar beet pulp and sesame cake. *Journal of the Science of Food and Agriculture*, **90:** 218-226.

Sirpa, O., Karenlampi, P., White, J. 2009. Potato proteins, lipids and minerals. *Advances in Potato, Chemistry and Technology*, **5:** 99-125.

Zahra, N., Nisa, A., Kalim, I., Saeed, K., Hina, S., Ahmed, I. 2015. Development, antioxidant activity, physicochemical and aflatoxin evaluation of herbal brain boosting product. *Research Journal of Chemical Sciences*, **5:** 46-49.