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TOTAL PHENOL CONTENT OF DIFFERENT VARIETIES OF BRINJAL (*SOLANUM MELONGENA* L.) AND POTATO (*SOLANUM TUBEROSUM* L.) GROWING IN BANGLADESH

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Abstract

The total phenol content (TPC) of different varieties of *Solanum melongena* L. varied from 3.16 ± 0.04 - 7.86 ± 0.33 mg GAE/g of fresh weight (FW). It also revealed that all varieties of *Solanum tuberosum* L. with peel contained higher TPC than without peel. Comparison between mean TPC of different varieties *Solanum tuberosum* L. with and without peel on FW basis by independent sample the t-test showed a significant difference ($p = 0.003$) in TPC. Findings of present study indicate that BARI Begun-8, high yielding varieties of *Solanum melongena* and *Solanum tuberosum* with peel are good sources of polyphenols and therefore may contribute as a source of dietary antioxidant.

Cellular oxidation and free radical mediated reactions are implicated in degenerative processes related to aging (Ames *et al*. 1994) and various chronic diseases such as cancer, atherosclerosis and diabetes (Gutterridge and Halliwell 1994, Briviba and Sioes 1994). Increasing trends in diet related chronic diseases becoming a key determinant of global public health problem. Many research findings established strong evidence that more than 90 per cent of diet related chronic diseases caused by oxidative stress due to active oxygen, other free radicals and lipid per oxidation. Therefore, management of oxidative damage is of great importance in the disease processes involving free radicals (Vayalil 2002). Polyphenolic compounds of foods drew the attention of researchers as a strong antioxidant and in particular, they help to scavenge the free radicals. Dietary polyphenols are prominent source of antioxidants for human, includes fruits, vegetables, spices and herbs (Graf *et al.* 2005). Potato, a staple food of many countries may act as antioxidant like other starchy foods in the human diet, as it contains carotenoids are primarily lutein, zexanthin, and violaxanthin, all of which are xanthophylls (Brown 2005). The purposes of the present study to evaluate the total phenolic content in highly consumed vegetables, which might play a significant source of phenolic compounds in diet for the prevention of chronic diseases and also contribute to the growing economy and development of Bangladesh by reducing the cost for the treatment of chronic diseases.

Fresh five different varieties of *Solanum melongena* L. and *Solanum tuberosum* L. were collected for the study. Edible portion of the fresh vegetables were cut into small pieces (< 0.25 cm) and dried at 55^{o}C in an oven. The dried matters were weighed, grinded and stored in desiccators prior to extraction. Hexane, dichloromethane, acetone and acetic acid were used for solvent extraction. Gallic acid, sodium carbonate and Folin-Ciocalteau reagent were used for estimation of total phenol. All chemicals used for the analysis were of analytical grade. Total phenol content (TPC) of the selected sample extracts was estimated colorimetrically according to

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the Folin-Ciocalteau method (Singlleton and Rossi 1965). A gallic acid standard curve of varying concentration was constructed by plotting gallic acid concentration on abscissa and absorbance on ordinates for quantification of total polyphenol. The total polyphenol content was expressed as gallic acid equivalent per fresh weight (mg GAE/g FW).

Potatoes with peel BARI ALU-7 (Diamant) contained the highest (77.8%) and potatoes without peel BARI ALU-8 (Cardinal) contained the highest (83.8%) moisture. The potatoes with peel were found to have a narrow range of TPC, from 1.0 ± 0.05 mg GAE/g for BARI ALU-8 (Cardinal) to 1.6 ± 0.04 mg GAE/g for BARI ALU-24 (Asterix) on fresh weight basis (Table 1). On the other hand, among the potatoes without peel BARI ALU- 26 (Felsina) contained the lowest (0.62 ± 0.05 mg GAE/g) and BARI ALU-13 (Granola) contained the slightly higher (1.0 ± 0.07 mg GAE/g) TPC. The TPC of white fleshed potatoes was 163 mg GAE/100 g whereas, red and purple fleshed potatoes have 138 mg GAE/100 g (Brown 2005). About 80% of phenolic acids are chlorogenic acid where predominant flavonoids are catechin, epicatechin for white fleshed potatoes and catechin, epicatechin, anthrocyanins are for the Red and purple fleshed potatoes (Pennington 2002). Highest difference in TPC of different varieties of potatoes with and without peel was found in BARI ALU-24 (Asterix) and lowest in BARI ALU-8 (Cardinal). Significantly higher TPC in potato with peel compared to without peel ($p = 0.003$) on fresh weight basis (Table 1), mainly due to high anthocyanin content of the peel (Brown 2005).

Table 1. Total phenol content of different varieties of *Solanum tuberosum* with peel. Values in the parenthesis represent without peel.

Cultivar variety (N = 5)	Moisture content (%)	TP content (mg GAE/g) DW basis	TP content (mg GAE/g) FW basis
BARI ALU-7 (Diamant)	77.8	4.8 ± 0.05	1.1 ± 0.01
	(81.9)	(4.0 ± 0.12)	(0.72 ± 0.02)
BARI ALU-8 (Cardinal)	75.2	4.0 ± 0.22	1.0 ± 0.05
	(83.2)	(4.2 ± 0.06)	(0.71 ± 0.01)
BARI ALU-13 (Granola)	76.6	7.4 ± 0.4	1.48 ± 0.07
	(80.3)	(5.3 ± 0.38)	(1.0 ± 0.07)
BARI ALU-24 (Asterix)	74.0	6.3 ± 0.17	1.6 ± 0.04
	(82.4)	(4.0 ± 0.14)	(0.73 ± 0.02)
BARI ALU- 26 (Felsina)	72.3	4.7 ± 0.06	1.3 ± 0.01
	(80.0)	(3.1 ± 0.18)	(0.62 ± 0.05)

($p = 0.003$).

The descending order of *Solanum melongena* according to moisture content are BARI Begun-5 (81.6%) > BARI Begun 1 (80.22%)>, BARI Begun-8 (80.16%)>, WHITE Begun (79.0%)>, BARI Begun-6 (75.04%) (Table 2). TPC of five different varieties of *Solanum melongena* is presented in Table 2. The *Solanum melongena* was found to have varying levels of TPC, ranging from 3.16 ± 0.04 mg GAE/g for BARI Begun-5 to 7.86 ± 0.33 mg GAE/g for BARI Begun-8 on fresh weight basis. According to the most recent study on 12 indigenous commonly consumed vegetables of Bangladesh reported that TPC of *Solanum melongena* was 271 mg GAE/100 g of fresh sample in green variety and 394 mg GAE/100 g in violet one (Sharmin *et al.* 2011). USDA (2007) database also showed that the TPC of brinjal was 930 mg GAE/100 g of fresh sample. A review article explained that environmental factors have major effects on polyphenol content, including soil type, sun exposure, rainfall, greenhouse or field, biological culture, hydroponic culture, fruits yield from tree etc. Exposure to light has a considerable effect on most flavonoids

and degree of ripeness considerable effects on the concentrations and proportion of phenols (Manach *et al.* 2004). Present study findings reflect that among the five different varieties of

Table 2. Total phenol content of different varieties of *Solanum tuberosum*.

Cultivar variety (N = 5)	Moisture content (%)	TP content (mg GAE/g) DW basis	TP content (mg GAE/g) FW basis
BARI Begun-1 (Brinjal)	80.22	21.2 ± 0.37	4.24 ± 0.07
BARI Begun-5 (Brinjal)	81.60	16.32 ± 0.22	3.16 ± 0.04
BARI Begun-6 (Brinjal)	75.04	16.38 ± 0.28	4.09 ± 0.07
BARI Begun-8 (Brinjal)	80.16	39.3 ± 1.6	7.86 ± 0.33
WHITE Begun (Brinjal)	79.0	22.1 ± 0.75	4.64 ± 0.15

brinjal studied BARI Begun-8 contained the highest and BARI Begun-5 contained the lowest TPC on fresh weight basis. However, the results of the present study reveal that *S. tuberosum* (brinjal) and *S. tuberosum* (potato) could be important source of polyphenols and exerts an antioxidant activity in the local diet.

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