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Polyphenol Content of Some Traditional Leafy Vegetables in Kolhapur District of Maharashtra

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ABSTRACT

Polyphenols are naturally occurring compounds found in the fruits and vegetables. They are produced during natural development and as a result of stress conditions. They acts as highly antioxidative in nature and hence helps to protect in some neurological diseases. The present investigation deals with the total polyphenol content of eight selected traditional leafy vegetables. The results reveals that among all traditional leafy vegetables under study the polyphenol content is maximum in *Amaranthus spinosus* 64.19 mg/100 g FW, followed by *Celosia argentea* 52.46 mg/100 g FW, while lowest in *Smithia sensitiva* 19.13 mg/100 g FW. Thus due to appreciable amount of the traditional leafy vegetables under study, these vegetables could be used as an antioxidant to overcome certain degenerative human disorders.

1. Introduction

Polyphenols are naturally occurring compounds found in the fruits and vegetables. They are large and varied class of metabolites widely spread throughout the Plant Kingdom [1]. Polyphenols are produced during natural development and as a result of stress conditions. They are abundantly present in human diet having a key role evidences in defense mechanism against ultraviolet radiation or aggression pathogen, aging [2]. There are more than 8,000 polyphenols which have been identified in various plant species. They are secondary metabolites which are not directly involved in any metabolic process [3]. Polyphenols are acting as the main dietary antioxidants and possess higher in vitro antioxidant capacity as compared to other phytochemicals such as vitamins and carotenoids [4]. As an antioxidant they may protect cell constituents against oxidative damage and therefore limit the risk of various degenerative diseases associated with oxidative stress such as cancers, cardiovascular diseases, hypertension, asthma and Diabetes (Fig. 1) [5-9]. Both in-vivo and in-vitro epidemiological studies of polyphenols have proved its role in prevention from formation of tumor [10].

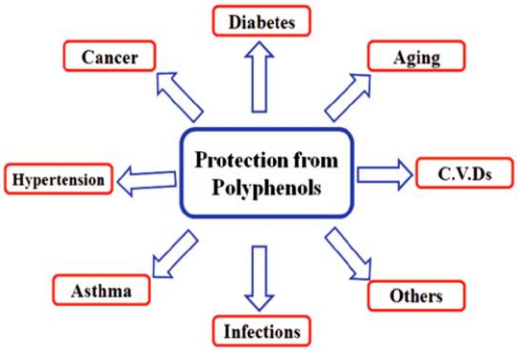

Fig. 1 Pleiotropic health beneficial effects of dietary plant polyphenols [8, 9]

Polyphenols protect the skin damage caused due to lipid peroxidation induced from UV radiation of Sunlight [11]. As polyphenols acts as highly antioxidative in nature they protect in some neurological diseases [12]. The vegetable and fruit polyphenols acts as potential agents to influence and modulate several cellular processes, such as signaling proliferation, apoptosis redox balance and differentiation [13]. Very recently it was proved the protective role of polyphenols against Parkinson's disease [14]. The polyphenolic content of food are greatly affected by environmental factors as well as edaphic factors like soil type, Sun exposure, rainfall etc. [7]. The quantities of polyphenols consumed daily available only in the form of epidemiological studies. The present investigation deals with the total polyphenol content in eight traditional leafy vegetables in Kolhapur district.

2. Experimental Methods

Polyphenols were estimated following the method by Folin and Denis [15]. The fresh leaves of selected traditional vegetables (0.5 g) were homogenized in mortar with pestle and extracted in 80% acetone at 0 to 4 °C in dark, with addition of a pinch of Magnesium carbonate, to protect and stabilize the chlorophylls. This extract was filtered through Whatman No. 1 filter paper under suction using Buchner's funnel. The residue was washed thoroughly 2-3 times with 80% acetone, collecting all the washings in the same filtrate, final volume of the filtrate was made to 100 mL with 80% acetone. From the acetone extract, 2 mL plant extract was mixed with 10 mL 20% Na_2CO_3 and the volume was made up to 35 mL with distilled water. To this mixture, 2 mL of Folin-Denis reagent (100 g sodium-tungstate together with 20 g phosphomolybdic acid was dissolved in about 800 mL distilled water, to this 50 mL of 85% phosphoric acid was added and the mixture was refluxed for 2.5 h) was added, mixed thoroughly and finally diluted to 50 ml with distilled water. The standard Tannic acid solution (0.1 $mgmL^{-1}$) was used for the preparation of standard polyphenol curve. A blank was prepared without polyphenolics. After development of blue colour, the absorbance was read at 660 nm on Double beam spectrophotometer (Shimadzu, UV-VIS 190, Japan).

3. Results and Discussion

Total polyphenol content of some selected traditional leafy vegetables in Kolhapur district is recorded in Table 1**.** The results reveals that among all traditional leafy vegetables in present investigation the polyphenol content is maximum in *Amaranthus spinosus* 64.19 mg /100 g FW followed by *Celosia argentea* 52.46 mg/100 g FW, while lowest in *Smithia sensitiva* 19.13 mg /100 g FW.

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Table 1 Polyphenol content in some traditional leafy vegetables selected for study

Sr. No.	Plant species	Polyphenols mg/100 g FW
1.	*Celosia argentea*	52.46 ± 0.02
2.	*Amaranthus spinosus*	64.19 ± 0.015
3.	*Amaranthus viridis*	39.50 ± 0.010
4.	*Cassia mimosoides*	26.54 ± 0.002
5.	*Cassia tora*	32.09 ± 0.015
6.	*Smithia sensitiva*	19.13 ± 0.01
7.	*Corchorus olitorius*	38.27 ± 0.20
8.	*Launaea procumbens*	49.38 ± 0.015

Values are means ± SD for three replicates

The results are found to be lowest as compared with previous report of polyphenol content of other wild leafy vegetablessuch as, *Centella asiatica* 150 mg Tannic acid/100 g FW, *Murraya koienigii* 387 mg /100 g, *Amaranthus* sp. 158.33 mg /100 g [16]. Whereas the total polyphenol content of *Ceiba patendra*, *Hibiscus sabdariffa* and *Amaranthus hybridus* ranging from 293.08 mg/100g, 251.12 mg/100 g and 238.67 mg/100 g respectively [17].

It was known that the polyphenol content of some common Indian leafy vegetables such as cabbage, coriander and spinach leaves was ranging from 5-69.5 mg of Tannic acid/g of extract [18]. All the available value of total polyphenolic content in traditional leafy vegetables under study show very less amount and hence does not involve in various harmful effects in degradation of proteins.

4. Conclusion

From the present investigation it is clear that the variable amount of total polyphenol content of different traditional leafy vegetables depend on the variety of vegetable and thus its comparison is difficult. The influence on polyphenol values may be due to different methods of harvesting and also environmental conditions. In present investigation the appreciable amount of polyphenol content of traditional leafy vegetables gives its antioxidant and medicinal potential to overcome certain degenerative human disorders.

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