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RESEARCH ARTICLE

EVALUATION OF ANTIOXIDANTS ACTIVITY OF SECONDARY METABOLITES OF PULSES AS COMPARED WITH AMLA USING DPPH

***Pramod Kumar Singh, Smruti Sohani and Neha Panwar**

Department of Biosciences, Christian Eminent College, Indore 452001, India

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ABSTRACT

In recent times, phytochemicals have drawn attention due to their potent antioxidant properties and their marked effects in the prevention of various oxidative stress associated diseases. A number of bioactive compounds in pulses such as polyphenols, phytic acid, trypsin inhibitor, tannin and lectin are proven to have anti-oxidant capacity. This study has assessed the antioxidants activity exhibited by these secondary metabolites in different pulses (*chickpea*, *mung*, *arhar* and *masur*) as compared with amla using DPPH radical scavenging activity.

INTRODUCTION

Human body is exposed to a large number of foreign chemicals everyday Santhakumari *et al*. (2003). Most of these chemicals are man-made and our inability to properly metabolize them negatively affects our health by the generation of free radicals. Free radicals are also generated during normal metabolism of aerobic cells Carmen and Florin (2009). The oxygen consumption inherent in cells growth leads to the generation of series of free radicals. Highly active free radicals and their uncontrolled production are responsible for numerous pathological manifestations such as cell tumor (prostate and colon cancers) and coronary heart diseases Karadenz *et al.* (2005). Antioxidants can significantly delay or prevent the oxidation of easily oxidizable substances Atrooz (2009). Natural antioxidants are classified according to their mechanism of action as chain-breaking antioxidants which scavenge free radicals or inhibit the initiation step or interrupt the propagation step of oxidation of lipid and as preventive antioxidants which somehow slow the rate of oxidation but do not convert free radicals Semalty *et al*. (2009). Plant derived antioxidants, such as phenolics, phytic acid and tannins are reported to have multiple biological effects, including antioxidants activity Soetan (2008). In recent times, natural antioxidants have attracted considerable interest among nutritionists' food manufacturer and consumers, due to their presumed safety and potential therapeutic value.

**Corresponding author: Pramod Kumar Singh,*
Department of Biosciences, Christian Eminent College, Indore 452001, India.

To derive the maximum health benefits, the present study reports the antioxidants activity exhibited by pulses photochemicals using DPPH free radical activity.

MATERIALS AND METHODS

The seeds of Green mung (*Vigna radiata*), Arhar (*Cajanas cajan*), Masur (*Lens esculantus*), and Chickpea (*Cicer arietimum* L.) and powered form of amla were procured from the local market of Indore, M.P. India.

Chemical Analysis

Total phenolic content (TPC) of each sample was estimated using the Folin–Ciocalteu colorimetric method according to Mallick and Singh (1980). Phytic acid was estimated following Wilcox *et al*. (2000). Tannins were measured as tannic acid equivalents Swain *et al.* (1959). DPPH radical scavenging activity was determined of all the phytochemicals according to the methods described by Liangi *et al.* (2002) and Hitoshi *et al.* (2004). For antioxidants activity methanolic extraction was done as per the procedures described by Tomoyuki *et al.* (2002) and Chidambara *et al.* (2002).

Statistical Analysis

All work was done in triplicates and the data presented are means ± S.D. of three independent determinations. Significance was accepted at $p>0.05$.

Table 1. Phytochemical of pulses and amla

S.No	Tannin (mg/gm)	Phenolics (mg/gm)	Phyticacid (mg/gm)
Masur	1.23±0.05	3.04±0.05	1.34±0.04
Gram	2.1±0.04	3.86±0.05	1.8±0.05
Mung	2.5±0.03	5.2±0.04	2.16±0.03
Arhar	1.94±0.04	2.76±0.04	1.6±0.02
Amla	3.87±0.05	9.68±0.04	2.96±0.04

Table 2. Antioxidant activities of phytochemicals using DPPH

S.No	DPPH of Tannin	DPPH of Phenolics	DPPH of Phytic acid	Antioxidants
Masur	5.18	10.44	8.55	19.3
Gram	8.32	23.07	15.44	22.72
Mung	14.13	20.20	13.30	23.8
Arhar	9.37	12.56	5.03	14.06
Amla	36.39	67.65	44.6	92.10

RESULTS AND DISCUSSION

For the present study materials were procured from local market of Indore M.P. which contains considerable amount of tannins, phytic acid phenols and antioxidants. The highest concentration of tannin was found in amla (3.87±0.05mg/gm) and lowest concentration was found in masur (1.23±0.05 mg/gm) (Fig.1). The phytic acid concentration varies widely in studied sample. The highest concentration was found in amla (2.96±0.04 mg/gm) and lowest in masur (1.34±0.04 mg/gm) (Fig. 1). The total phenolics contents also vary in different samples. The highest concentration was again found in amla (9.68 ±0.04mg/gm) and lowest concentration was found in arhar (2.76±0.04 mg/gm) (Fig.1). The antioxidant activities of phytochemicals were expressed as percent DPPH radical scavenging activity with higher values indicating greater antioxidant activity. The antioxidant activity of phytochemicals ranged from 14.06– 92.10% with the highest activity exhibited by amla and the lowest activity exhibited by arhar (Table 2). Phytochemicals of amla showed maximum inhibition of DPPH as follows: Antioxidants (92.10%) > Phenolics (67.65%)> Phytic acid (44.6%) and tannin (36.39%) while in other pulses, phytochemicals of mung bean showed the maximum inhibition of DPPH as compared with other pulses as follows: (23.8%) Antioxidants > (20.20 %) phenolics > (14.13%) tannin and (13.30%) phytic acid respectively. In our results there is a good linear correlation between the total phenolic content and the scavenging of DPPH radical in each extract. These results indicated that the radical scavenging capacity of each pulses might be mostly related to their concentration of phenolic hydroxyl group. The antiradical activity of phenolic compounds depends on their molecular structure, on the availability of phenolic hydrogens and on the possibility for stabilization of the resulting phenoxyl radicals formed by hydrogen donation (Singh *et al.* 2014). Our results are agreement with Kumar *et al.* (2006) that free (EOFP) and bound phenolics (EOBP) of *Emblica officinalis* showed four- to 10-fold higher levels of antioxidant activity as evaluated by both free radical scavenging and reducing power assays compared to that of *Curcuma longa* free (CLFP) and bound phenolics (CLBP). Higher level of antioxidant activity in *E. officinalis* has been attributed to the phenolic content (12.9%, w/w, correlation coefficient R=0.74) in them. The free and bound phenolics of *E. officinalis* showed high content of phenolic compounds (126 and 3.0 mg/g) compared to that of *C. longa* (29.7 and 1.6 mg/g). Gallic acid and tannic acid were identified as the major antioxidant components in phenolic fractions of *E. officinalis.*

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