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Short Communication

Comparison of Physicochemical Characteristics and radical scavenging potential of *Punica granatum* L. peel Procured From Two Different Herb Suppliers

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Abstract

Objectives: The present study is focused on the comparative appraisal of physico-chemical characteristics and free radical scavenging action of methanol extract of *Punica granatum* L. peel obtained from two different herb suppliers. **Methodology**: The dried fruit peels of *P. granatum* were procured from two suppliers with batch code of #4 and #5. The various physico-chemical parameters of two batches were analyzed and compared. The well-authenticated and validated samples were then extracted with methanol and evaluated for their free radical scavenging potential by 2, 2-diphenyl-1-picrylhydrazyl assay. **Results:** The results obtained showed that peel extract from batch #4 has a good anti-radical potential against DPPH free radicals as compared to batch #5. This might be attributed to the better physico-chemical characteristics of batch #4 in comparison to #5. **Conclusion**: The study suggests that the better physico-chemical characteristics of plant samples may advocate their potent bioactive efficacy substantiating superior pharmaceutical significance.

Key words: *Punica granatum* L.; physico-chemical; free radicals; antioxidant.

INTRODUCTION

Punica granatum L. belonging to the family Punicaceae has numerous traditional uses and commercial significance. The fruit peel is considered as a nutraceutic source possessing numerous therapeutic actions *viz.*, antioxidant, anti-bacterial, anti-mutagenic, anti-viral, anti-inflammatory, anti-hyperglycemic and hepatoprotective[1-5]. These therapeutic actions are credited to the presence of bioactive compounds such as phenolics, flavonoids, tannins, punicalagin and punicalin[6]. The silver nano-particles synthesized from this eco-friendly biological waste are used as a green catalyst for the reduction of carcinogenic 4-nitrophenol to 4-aminophenol[7]. It is also used as a biosorbent to remove nickel from waste water[8]. As per our literature survey, meager reports are accessible on the comparative intervention of physico-chemical characteristics with anti-radical efficacy of two batches of *P. granatum* L. peels. Thus, the present study was planned to elucidate the link between physico-chemical parameters and potential radical scavenging capacity.

Materials and Methods

***Procurement of raw material*:** The well-authenticated, validated and dried fruit peel samples of *Punica granatum* L. were procured from two different herb suppliers i.e. S.K. Vipin Kumar, Amritsar and Jagdish Kumar/Rajiv Kumar, Amritsar with batch code of #4 and #5 respectively.

***Evaluation of physico-chemical characteristics*:** The various physico-chemical parameters *viz*. loss on drying, total ash, acid insoluble ash, water soluble ash, ether soluble extractive value, chloroform soluble extractive value, alcohol soluble extractive value and water soluble extractive value of two batches were analyzed following recommendations of World Health Organization and Ayurvedic Pharmacopoeia of India[9,10].

***Preparation of extract*:** The coarsely powdered samples were extracted with methanol in a soxhlet extractor followed by drying on rotary vacuum evaporator. The extracts were then stored at 4°C till further use.

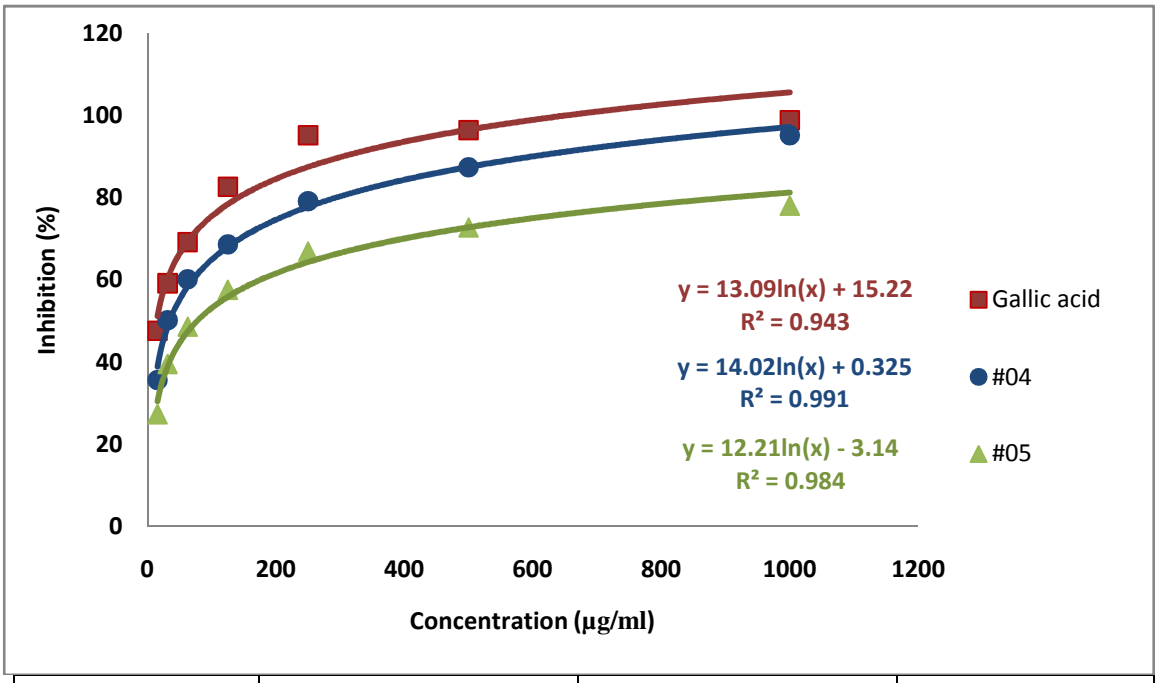
***DPPH free radical scavenging assay*:** The radical scavenging ability of methanolic peel extracts was investigated by following the procedure given by Blois (1958) employing 2,2′-diphenyl-1-picrylhydrazyl (DPPH) radicals as substrate[11].

Results and Discussion:

In the present communication, an attempt has been made to associate anti-radical activity of plant extracts with the physico-chemical characteristics of crude sample. These characteristics determine the quality of herbal raw materials to achieve the desired product specifications. The minimal level of moisture content is required to prevent bacterial, yeast and fungi growth during storage. Ash values represent the quality and purity of crude drug. The acid insoluble ash is an indication of contamination with earthy materials while water soluble ash refers to the presence of inorganic contaminants in drug sample. The extractive values provide an estimation of the presence of active phytoconstituents on extraction with a particular solvent[12]. The various physico-chemical parameters are depicted in **Table 1**. As seen from table, the physico-chemical parameters of batch #4 and #5 differed significantly. The batch #4 obtained from the supplier S.K. Vipin Kumar (Amritsar) has better physico-chemical specifications as compared to #5. The disparity in physico-chemical constants could be attributed to the factors such as, geographical location, type of soil, period of harvesting, post-harvesting methods and storage conditions which affect the quality of herbal drug[13].

Table 1: Comparative analysis of physico-chemical parameters of *P. granatum* L. peel of two different batches.

S. No.	Physico-chemical Parameter	Physico-chemical values obtained (% w/w)		F-ratio	Specification	Protocol
		#4 (S.K. Vipin Kumar, Amritsar)	#5 (Jagdish Kumar/Rajiv Kumar, Amritsar)			
1.	Loss on Drying	8.083 ± 0.087	10.878 ± 0.045	803.165*	-	-
2.	Total Ash	4.032 ± 0.028	6.289 ± 0.574	15.408 *	4 % (Max.)	API
3.	Acid Insoluble Ash	0.348 ± 0.025	1.435 ± 0.109	93.541 *	0.4 % (Max.)	
4.	Water Soluble Ash	1.581 ± 0.089	2.354 ± 0.033	65.418 *	-	-
5.	Ether Soluble Extractive Value	0.837 ± 0.024	0.666 ± 0.026	22.316 *	-	-
6.	Chloroform Soluble Extractive Value	1.249 ± 0.046	0.96 ± 0.046	19.671 *	-	-
7.	Alcohol Soluble Extractive Value	21.970 ± 0.029	17.706 ± 0.106	1486.412*	9 % (Min.)	API
8.	Water Soluble Extractive Value	25.645 ± 0.142	24.965 ± 0.145	11.146	20 % (Min.)	API



	Gallic acid	#04	#05
IC_{50} (µg/ml)	14.25	34.58	77.65

Figure 1: Anti-radical activity of methanolic extract of batch #4 and #5 of *Punica granatum* L. peel assessed by 2,2′-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay.

Further, the methanolic extracts of two batches were evaluated for their radical scavenging action against DPPH free radicals by analyzing the reduction in absorbance at 517 nm. **Figure 1** shows the dose dependent increase in the percentage inhibition of free radicals. The peel extracts exhibited concentration dependent loss of violet color with elevation in percentage scavenging of DPPH radicals. However, the peel extract #4 resulted in the production of yellow colored diamagnetic stable molecule 2,2′-diphenyl-1-picrylhydrazine from 2,2′-diphenyl-1-picrylhydrazyl radicals with IC_{50} of 34.58 µg/ml and exerted better anti-radical efficacy indicating superior capability than #5 (Figure 1). This might be attributed to its ability to donate hydrogen atoms enabling termination of free radical generation. The lower IC_{50} value of batch #4 could be related to its better physico-chemical specifications than batch #5 as observed from Table 1.

Conclusion

It could be concluded from the present study that initial physico-chemical characteristics of plant samples may advocate their better bioactive potential substantiating superior pharmaceutical significance. Hence, this study is constructive in selecting the better sample and carrying out further research in the Ayurvedic System of Medicine.

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Conflict of interest

The authors declare no conflict of interest.

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