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Research Article

A COMPARATIVE SCREENING AND EVALUATION OF THE TOTAL PHENOLICS, FLAVONOIDS, AND ANTIOXIDANT PROPERTIES IN THE SEED EXTRACTS OF *PUNICA GRANATUM* L., *PSIDIUM GUAJAVA* L., AND *VITIS VINIFERA* L.

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ABSTRACT

Objectives: The synthetic antioxidants produce numerous adverse effects to overcome these adverse effects and the use of natural products is the alternative. In this study, the evaluation of total phenolics, flavonoid contents, and antioxidant properties of *Punica granatum, Psidium guajava,* and *Vitis vinifera* seed extracts was done.

Methods: The total phenolic content was estimated with gallic acid equivalent and the total flavonoid contents were estimated on quercetin equivalent. For the antioxidant properties of selected seed extracts, the 2,2-diphenyl-1-picrylhydrazyl radical scavenging, ferrous reducing power, and hydrogen peroxide radical scavenging assays were followed to find the free radical scavenging ability of the selected seed extracts.

Results: The ethyl acetate extract of *P. granatum* seed contains higher phenolic content (70.25±1.25 µg/ml) and flavonoid content (58.15±1.85 µg/ml) and possesses a high free radical scavenging ability. Based on the inhibitory effects of fruit seeds against synthetic radicals, they can be ranked as *P. granatum*>*P. guajava*>*V. vinifera*.

Conclusion: According to overall observations of the study, the pomegranate seed extract contains a higher level of phenolic and flavonoid contents and shows a higher scavenging effect against free radicals among the others seeds. Phytochemical screening showed that the ethyl acetate extract of pomegranate fruit seed possesses more secondary metabolites compared to other seed extracts.

Keywords: Antioxidant, *Punica granatum*, *Psidium guajava, Vitis vinifera*, Photochemical, Flavonoid and phenolic contents, Reactive oxygen species.

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INTRODUCTION

Medicinal plants play a vital role in the pharmaceutical industry, and nowadays, they are meant to cure cancer and other ailments [1]. The introduction of antibiotics and other modern drugs came recently after the use of medicinal plants all over the world. Phytoflavonoids are potent water-soluble antioxidants and free radical scavengers which prevent oxidative cell damage and have strong anticancer activity. Various research evidence suggests that the free radicals induce oxidative damage in living cells and lead to various diseases, including inflammation, aging, diabetes mellitus, and cancer [2]. Effective chemotherapeutic agents have been reported from the origin of higher plants for the management of chronical diseases, nephrotoxicity, liver cirrhosis, diabetes, neurodegenerative disorders, atherosclerosis inflammation, and cancer. The reactive oxygen species play a vital role in causing various diseases in the forms of activated oxygen, such as superoxide (O_2^-) and hydroxyl radicals [3]. The studies of epidemiological clinical, experimental, H_2O_2, and singlet oxygen gives prove for work of all aerobic organisms including in the etiology of cancer. The intake antioxidant dietary components is good due to the insufficient defense mechanism in human antioxidants that protect against radical damage.

The metabolites and phytoconstituents from medicinal plants such as polyphenolics and flavonoids have been discovered as free potent atom scavengers [4]. The antioxidant capacity of phenolic compounds is mainly attributed to their redox properties, which enable them to react as a reducing agent, electron donor, oxygen quencher singular, or chelate [5]. The study of medicinal plants and fruits strongly support the idea that the plant constituents with antioxidant activity are capable of exerting protective effects against developing oxidative stress in the biological systems [6]. In Asia and Africa, inflammation, infections, cancer, and serious diseases are treated by folk medicine, and a large part of the population still relies on natural plants [2]. The antioxidant activities of fruit seeds in the continuation of our experimental work, the major phytoconstituents present in each extract, and the *in vitro* free radical scavenging potential of three edible fruit seeds such as pomegranates (*Punica granatum*), guava (*Psidium guajava*), and grapes (*Vitis vinifera*) were investigated. This type of fruits is cultivated in tropical and subtropical regions; they have got nutritional value with vitamins that boost human immunity. The peel, fruit, and pomace of these edible fruits have been reported for their medicinal phytoconstituents such as anti-inflammatory and antioxidants [7].

METHODS

Fruit collection and extraction of phytoconstituents

Seeds of edible fruit such as pomegranate (*P. granatum*), guava (*P. guajava*), and grapes (*V. vinifera*) were collected from juice-making industry after the extraction of juice in Coimbatore, Tamil Nadu, India.

Then, the seeds were dried under room temperature for a week and ground to powder using an electric grinder. The powdered seed materials of *P. granatum, P. guajava,* and *V. vinifera* (100 g) were exhaustively extracted using organic chemicals (petroleum ether, ethyl acetate, chloroform, methanol, and ethanol). The ratio was 1:5 (w/v) for 12 h using Soxhlet apparatus with 5–6 suctions. The extract was evaporated to dryness using an evaporator dish [8].

Screening of phytochemical with various organic solvent extracts of fruit seeds

Qualitative phytochemical tests on *P. granatum*, *P. guajava*, and *V. vinifera* seed extracts were carried out to identify the availability of the main

phytoconstituents including alkaloids, tannins, saponins, flavonoids, cardiac glycosides, carbohydrates, amino acids, and polyphenols [9,10].

To estimate total phenolic contents (TPCs) in seeds extract

The TPC of selected fruit seed extracts (petroleum ether, ethyl acetate, chloroform, methanol, and ethanol extract of *P. granatum*, *P. guajava*, and *V. vinifera* seed) was determined using gallic acid equivalence (GAE). Following Singleton *et al*. [11] method with modifications, the dry extracts were diluted with respective solvents, and mg/ml of the concentration was transferred to test tubes, to which 0.5 ml undiluted Folin–Ciocalteu reagent was added. After 1 min, 1.5 ml of 20% (w/v) Na_2CO_3 was added and the volume made up to 10 ml with distilled water. The reaction mixture was incubated at 25°C for 1 h, and the absorbance was measured at 760 nm and compared with a pre-prepared gallic acid calibration curve [12]. The end point of reaction mixture was noted by the formation of blue color.

To determine total flavonoid content in fruit seed extracts

The total flavonoid contents in petroleum ether, ethyl acetate, chloroform, methanol, and ethanol extract of *P. granatum*, *P. guajava*, and *V. vinifera* fruit seeds were assessed, following Marinova *et al.* [13] method with a slight modification, by which 0.5 ml of 2% $AlCl_3$ solution of ethanol was mixed with 1 ml of extract (mg/ml). The 510 nm absorbance was measured after 1 h incubation at room temperature. The presence of flavonoid was indicated by a yellow color, and a quercetin equivalent was used to calculate the total flavonoid content.

Antioxidant activity of fruit seed extracts

2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity

The scavenging ability of *P. granatum*, *P. guajava,* and *V. vinifera* seeds with DPPH radical was assessed [14,15]. Briefly, aliquot of the extracts 20–100 µg/ml was mixed with 3.0 ml DPPH (0.5 mmol/L, and the absorbance was read at 517 nm after 30 min incubation at 37°C. The following formula was arrived for the percentage of scavenging activity;

$$\text{Percentage of inhibition (\%)}=[(A_{control}-A_{sample})/A_{control}]\times 100.$$

Where $A_{control}$ - absorbance of DPPH

A_{sample} - Absorbance reaction mixture (DPPH with sample).

Ferrous reducing power

The reducing ability of selected fruit seed extracts was measured according to the method of Manquian-Cerda *et al*. [16]. Various concentrations of extracts were mixed with 20–100 µg/ml, 0.2 M, pH 6.6, and 2.5 ml of potassium ferricyanide (1%) with 2.5 ml of phosphate buffer, the incubation of mixture was done at 50°C for 20 min with trichloroacetic acid (10%; 2.5 ml), and centrifugation was done at 3000 rpm at 10 min. 2.5 ml of distilled water was mixed with supernatant (2.5 ml), 0.5 ml of ferric chloride (1%) was added, and the absorbance was measured at 700 nm. The greatest reducing power was indicated by a higher absorbance of the reaction mixture. The reducing power of guava, pomegranate, and grape seed extracts was equated with that of L-ascorbic acid.

Radical scavenging activity of hydrogen peroxide

The hydrogen peroxide atom-salvaging effects of selected fruit seed extracts were assessed [17]. Aliquots of extracts 20–100 g/ml were added in 0.6 ml hydrogen peroxide with phosphate buffer (pH 7.4). 230 nm reading was made against the blank solution with phosphate buffer after the mixtures were incubated at room temperature for 10 min, and the inhibition percentage was calculated based on the following formula:

$$\text{\% of inhibition}=(A_1-A_2)/A_1 100.$$

Where A_1 - absorbance of the H_2O_2 and A_2 - absorbance of the reaction mixture.

Statistical analysis

The experiments were done 3 times, and the result was evaluated as a mean standard deviation.

RESULTS AND DISCUSSION

Phytochemical screening of fruit seed extracts

The most phytochemicals were present in ethyl acetate extract of *P. granatum* fruit seed compared to that of *P. guajava* and *V. vinifera* seeds. The presence of alkaloid, flavonoids, tannins, saponins, and terpenoids in all the solvent extracts of *P. granatum*, *P. guajava*, and *V. vinifera* seeds is shown in Table 1. Compared to the selected three fruit seed extracts, the ethyl acetate extract of *P. granatum* seed extract contains more primary and secondary metabolites, which include alkaloids, flavonoids, steroids, carbohydrates, cardio glycosides, saponins, oil, fats, and terpenoids [18]. In recent years, the search for phytochemicals possessing antioxidant properties has been on the rise due to their potential use in the therapy of various chronic and infectious diseases. The phytochemical screening of the extracts revealed the presence of alkaloids, tannins, glycosides, flavonoids, and polyphenols in the extracts of petroleum ether, ethyl acetate, chloroform, methanol, and ethanol extracts of *P. granatum*, *P. guajava,* and *V. vinifera* seeds [19,20].

The TPC of selected fruit seed extracts

TPC of the selected fruit seed extracts was expressed with GAEs, and the contents were obtained using regression calibration curve $Y=0.603X–0.5663R^2=0.9989$. The high TPC was observed in ethyl acetate extract of *P. granatum* (70.25±1.25 µg/ml), *P. guajava* (58.55±1.45 µg/ml), and *V. vinifera* (60.35±0.75 mg/l) among the other solvent extracts of seeds. Using the standard calibration curve of gallic acid, the TPC of different solvent extracts of *P. guajava* seeds is found at the range from 30.20±1.22 to 58.55±1.45 µg/ml; *V. vinifera* fruit seed extracts contain from 28.05±0.77 to 60.35±0.75 µg/ml. *P. granatum* fruit seed extract contains higher TPC as 70.25±1.25, 58.11±1.66, 43.33±1.35, 40.45±1.22, and 38.17±1.57 µg/ml of ethyl acetate extract, methanolic, petroleum ether, ethanol, and chloroform solvent extracts, respectively, with GAE. This shows that ethyl acetate *P. granatum* seed extract has a high phenolic content ability [21-23].

Numerous studies have highlighted great similarities with antioxidant biomolecules, TPC, and antioxidant activity, proving the importance of polyphenols as an effective phytoconstituents in plants [24]. Currently, there are reports which show an effective relationship between total phenolic and antioxidant activity, which appears to be the trend in many plant species. Hence, phenolic and flavonoid compounds seem to have antioxidant activity that plays an important role in stabilizing lipid reduction. The higher antioxidant activity in this study arises from the high phenolic content of the fruit seed extracts [25].

To determine total flavonoid content

Using the regression calibration curve with quercetin equivalent ($Y=0.1211X–0.129R^2=0.9985$), the total flavonoid content of selected fruit seeds is arrived at. Among the different solvent extracts of seeds (*P. granatum*, *P. guajava,* and *V. vinifera*), the ethyl acetate extract of seeds contains higher flavonoid content. The results show the total flavonoid contents as 55.45±1.15, 48.55±1.15, and 58.15±1.85 µg/ml of ethyl acetate extract of *P. guajava, V. vinifera,* and *P. granatum* seeds, respectively. In different solvent extracts, *P. guajava* seed contains the total flavonoid content ranging 24.15±1.35–55.45±1.15 µg/ml and *V. vinifera* fruit seed ranging 30.85±2.15–48.55±1.15 µg/ml. Using the standard calibration curve with quercetin, the total flavonoid contents of *P. granatum* fruit seed extracts are found to be 58.15±1.85, 54.45±2.65, 44.15±2.25, 37.25±1.35, and 29.50±0.95 µg/ml on ethyl acetate, methanol, chloroform, petroleum ether, and ethanol extract of *P. granatum,* respectively, with quercetin equivalent [26].

***In vitro* antioxidant assay of selected fruit seed extracts**

DPPH radical scavenging activity

The petroleum ether, ethyl acetate, chloroform, methanolic, and ethanol extracts of *P. granatum*, *P. guajava,* and *V. vinifera* seeds showed good

antioxidant capacity and higher inhibitory activity in ethyl acetate extract of *P. granatum* (half maximal inhibitory concentration [IC_{50}] 30.70±0.78 µg/ml) seed against synthetic free atoms compared to the L-ascorbic acid (22.15±0.5 µg/ml). The decreasing absorbance was observed in the DPPH radical scavenging activity due to the scavenging ability of the extracts [4]. The percentage inhibition of different solvent extracts of *P. granatum, P. guajava,* and *V. vinifera* against synthetic free radical ranges from 17% to 65% (Figs. 1-3). The least IC_{50} value is found in the ethyl acetate extract of selected fruits compared to the other solvent extracts (Table 2). The IC_{50} value of L-ascorbic acid is 22.15±0.5 µg/mg. A lower IC_{50} value indicates a higher potential of the extracts. The ability of DPPH radical scavenging activity is higher in *P. granatum* extract compared to other extracts [27,28]. Reported that, plant fractions inhibit the DPPH radicals in an independent manner with similar findings, as ethyl acetate fractions of strawberry contain more inhibitory effects.

The antioxidant activity of the extracts was conducted based on their ability to trap DPPH atom. DPPH is a stable free radical method which is a sensitive way to determine the free radical and hydrogen atom to attract an electron or hydrogen radical to become a stable magnetic molecule. The free radicals are involved in various disorders such as neurodegenerative diseases and cancer [5]. The extracts were tested for free radical scavenging ability with synthetic free radical (DPPH) which inhibited the free radical in increasing the concentration of the extracts. This result proved that the seed extracts were capable of giving an electron or hydrogen which could react with DPPH radical. The variation observed between the scavenging activities of the extracts depended on the type of fruit seeds and solvent used for the study. These differences could be attributed to an unequal distribution of the antioxidant phytomolecules such as polyphenol, flavonoids, and alkaloids, identified in the different concentrations of fruit seeds [29].

The extract of the ethyl acetate *P. granatum* fruit seed extract has a high free-atom salvaging activity. Many categories of phytocompounds which play a symbiotic role are obtained from extracts to boost the biological activity. Moreover, the antioxidant activity of these extracts to give hydrogen or electron atom to entrap DPPH atom depends on its presence [30].

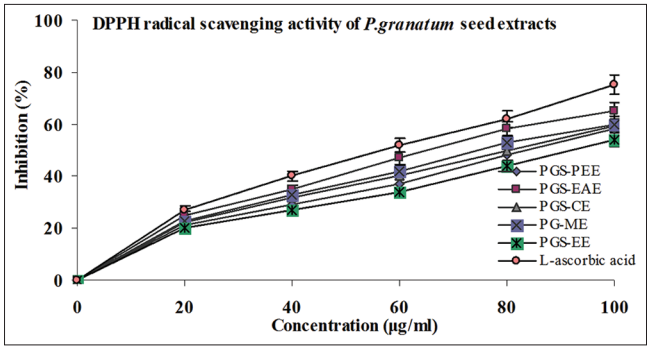

Fig. 1: Inhibitory effect of *Punica granatum* seed extracts against 2,2-diphenyl-1-picrylhydrazyl radical. PGS-PEE: Petroleum ether extract of *Punica granatum* seed, PGS-EAE: Ethyl acetate extract of *Punica granatum* seed, PGS-CE: Chloroform extract of *Punica granatum* seed, PGS-ME: Methanol extract of *Punica granatum* seed, PGS-EE: Ethanol extract of *Punica granatum* seed

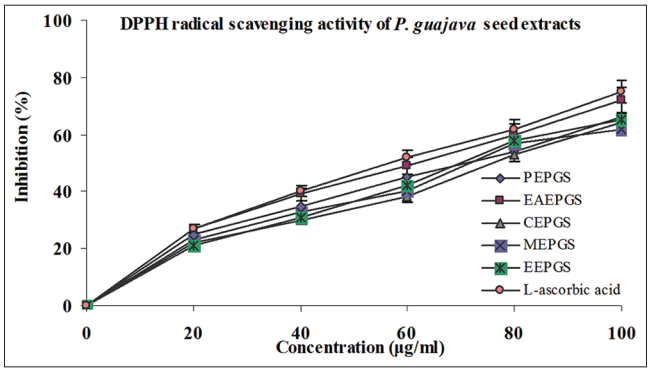

Fig. 2: Inhibitory effect of *Psidium guajava* seed extracts against 2,2-diphenyl-1-picrylhydrazyl radical. PE-PGS: Petroleum ether extract of *Psidium guajava* seed, EAE-PGS: Ethyl acetate extract of *Psidium guajava* seed, CE-PGS: Chloroform extract of *Psidium guajava* seed, ME-PGS: Methanol extract of *Psidium guajava* seed, EE-PGS: Ethanol extract of *Psidium guajava* seed

Table 1: Screening of major phytochemicals in selected fruit seed extracts

Seed extracts major phytochemicals	*V. vinifera* seed extracts using					*P. guajava* seed extracts using					*P. granatum* seed extract using				
	P.E	E.A	Ch	M	E	P.E	E.A	Ch	M	E	P.E	E.A	Ch	M	E
Alkaloids	-	+	-	+	-	-	+	-	+	-	-	+	+	+	-
Steroids	-	+	-	-	-	+	-	-	+	+	+	+	+	-	-
Flavonoids	-	+	+	+	+	-	+	-	+	+	-	+	-	+	+
Tannins	-	+	+	+	+	-	+	+	-	+	-	-	+	+	-
Amino acids	-	-	-	-	-	+	-	+	-	-	-	-	-	+	-
Carbohydrates	-	-	-	+	+	-	+	-	+	+	-	+	-	+	+
Cardio glycosides	-	-	-	+	+	-	-	-	+	-	-	+	+	-	+
Saponins	-	+	+	+	-	-	+	+	+	-	-	+	-	-	+
Oils and fats	+	-	-	-	-	+	-	+	-	-	+	+	-	-	-
Terpenoids	+	-	+	-	-	-	+	+	-	-	+	+	+	+	-

+Positive, –Negative, P.E: Petroleum ether, E.A: Ethyl acetate, Ch: Chloroform, M: Methanol, E: Ethanol. *P. granatum: Punica granatum, P. guajava: Psidium guajava, V. vinifera: Vitis vinifera*

Table 2: IC_{50} value of seed extracts against DPPH

	P. granatum seed extracts µg/ml	*P. guajava* seed extracts µg/ml	*V. vinifera* seed extracts µg/ml
Petroleum ether extract	45.60±1.50	48.5±1.1	45.2±0.9
Ethyl acetate extract	30.70±0.78	35.15±1.05	40.10±0.80
Chloroform extract	52.80±2.60	55.55±1.3	59.05±0.6
Methanol extract	38.70±0.1	40.15±0.75	51.2±0.10
Ethanol extract	56.95±0.80	59.48±0.7	63.5±0.35

IC_{50}: Half maximal inhibitory concentration, DPPH: 2,2-diphenyl-1-picrylhydrazyl, *P. granatum: Punica granatum, P. guajava: Psidium guajava, V. vinifera: Vitis vinifera*

Ferrous reducing power of selected fruit seed extracts

The ferrous reducing power of the selected fruit seed extracts shows an increasing absorbance with increasing concentration of the samples. In Figs. 4-6, the high antioxidant capacity of the extracts is indicated by the higher absorbance value. The result gives an important value on ethyl acetate extract of *P. granatum* seed compared to the other extracts. The outcome shows that the extract contains ferric (Fe^{3+}) reduction ability to Fe^{2+} [31]. In proving the antioxidant capacity of the extract, similarity was noted in previous reports of capuli fruits and berries by Songsermsakul *et al.* [32].

Hydrogen peroxide radical scavenging activity

The radical scavenging ability of hydrogen peroxide of the selected fruit seed extracts is demonstrated. The inhibition percentage for selected seed extracts against H_2O_2 atoms ranges between 25% and 65% (Figs. 7-9), and the ethyl acetate extract of *P. granatum, P. guajava,* and *V. vinifera* seeds is found to have higher inhibition in relating to other organic solvent extracts of seeds. The IC_{50} value of the extracts as shown in Table. 3 shows that the ethyl acetate extract of selected seeds (*P. granatum, P. guajava,* and *V. vinifera*) has potent inhibitory effects with less concentration of the extracts. The results show that the *P. granatum* seed contains more hydrogen peroxide radical scavenging activity compared to *P. guajava* and *V. vinifera* seed extracts. The standard used is L-ascorbic acid and IC_{50} 40.22±0.44 µg/ml. The antioxidant activity of selected fruit seed extract shows a high antioxidant level on ethyl acetate *P. granatum* seed extracts in relation to *P. guajava* and *V. vinifera* solvent extracts [33].

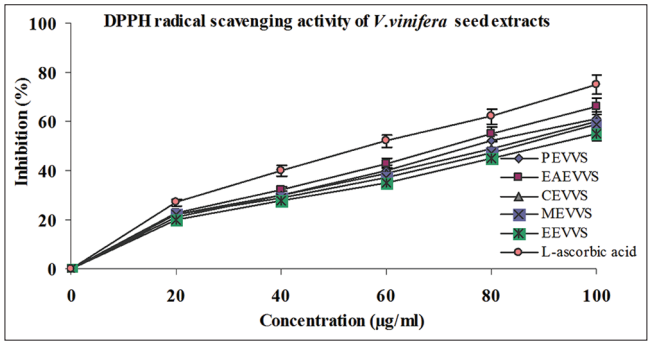

Fig. 3: Inhibitory effect of *Vitis vinifera* seed extracts against DPPH radical. PE-VVS: Petroleum ether extract of *Psidium guajava* seed, EAE-VVS: Ethyl acetate extract of *Psidium guajava* seed, CE-VVS: Chloroform extract of *Psidium guajava* seed, ME-VVS: Methanol extract of *Psidium guajava* seed, EE-VVS: Ethanol extract of *Psidium guajava* seed

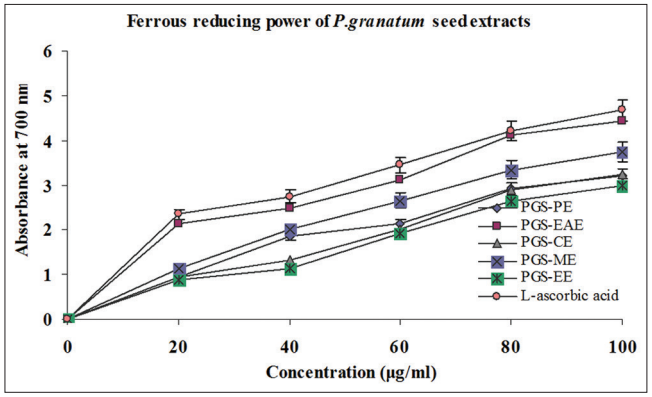

Fig. 4: Ferrous reducing power of *Punica granatum* seed extracts. PGS-PEE: Petroleum ether extract of *Punica granatum* seed, PGS-EAE: Ethyl acetate extract of *Punica granatum* seed, PGS-CE: Chloroform extract of *Punica granatum* seed, PGS-ME: Methanol extract of *Punica granatum* seed, PGS-EE: Ethanol extract of *Punica granatum* seed

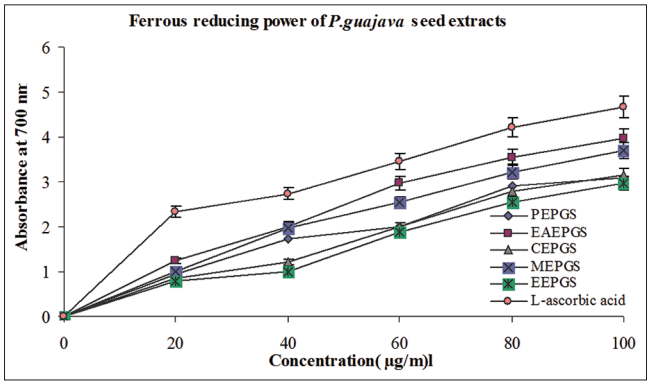

Fig. 5: Ferrous reducing power of *Psidium guajava* seed extracts. PE-PGS: Petroleum ether extract of *Psidium guajava* seed, EAE-PGS: Ethyl acetate extract of *Psidium guajava* seed, CE-PGS: Chloroform extract of *Psidium guajava* seed, ME-PGS: Methanol extract of *Psidium guajava* seed, EE-PGS: Ethanol extract of *Psidium guajava* seed)

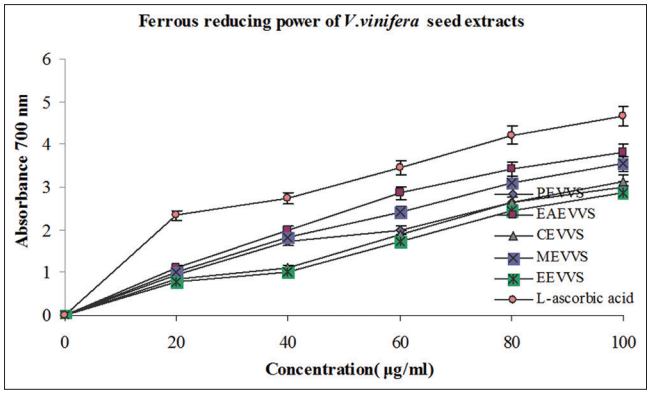

Fig. 6. Ferrous reducing power of *Vitis vinifera* seed extracts. PE-VVS: Petroleum ether extract of *Psidium guajava* seed, EAE-VVS: Ethyl acetate extract of *Psidium guajava* seed, CE-VVS: Chloroform extract of *Psidium guajava* seed, ME-VVS: Methanol extract of *Psidium guajava* seed, EE-VVS: Ethanol extract of *Psidium guajava* seed

Table 3: IC_{50} value of seed extracts against H_2O_2

Fruit seeds organic solvent extracts	*P. granatum* seed extracts µg/ml	*P. guajava* seed extracts µg/ml	*V. vinifera* seed extracts µg/ml
Petroleum ether extract	59.98±0.44	62.53±0.56	67.58±0.66
Ethyl acetate extract	45.05±1.15	50.15±1.75	52.11±0.44
Chloroform extract	63.22±0.77	65.05±0.45	72.55±0.66
Methanol extract	52.22±0.34	57.56±0.77	60.88±0.64
Ethanol extract	65.5±0.22	72.88±0.98	78.54±0.88

IC_{50}: Half maximal inhibitory concentration, *P. granatum: Punica granatum, P. guajava: Psidium guajava, V. vinifera: Vitis vinifera*

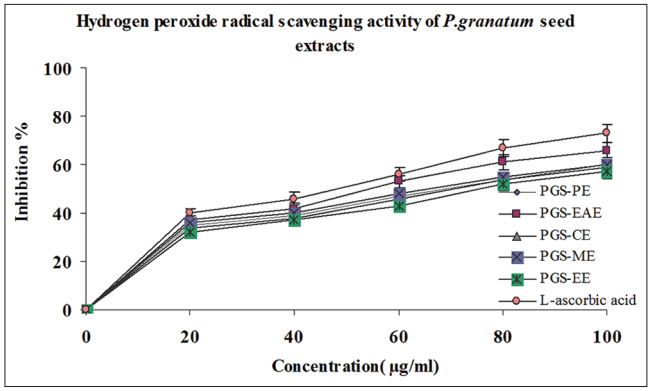

Fig. 7: Inhibitory effect of *Punica granatum* seed extracts against H_2O_2 radical. PGS-PEE: Petroleum ether extract of *Punica granatum* seed, PGS-EAE: Ethyl acetate extract of *Punica granatum* seed, PGS-CE: Chloroform extract of *Punica granatum* seed, PGS-ME: Methanol extract of *Punica granatum* seed, PGS-EE: Ethanol extract of *Punica granatum* seed

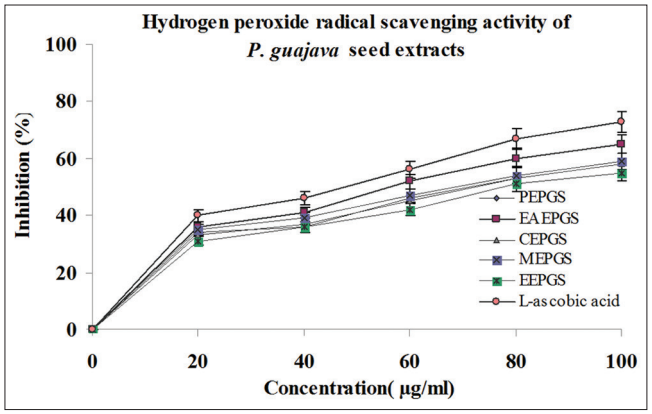

Fig. 8: Inhibitory effect of *Psidium guajava* seed extracts against H_2O_2 radical. PE-PGS-Petroleum ether extract of *Psidium guajava* seed, EAE-PGS: Ethyl acetate extract of *Psidium guajava* seed, CE-PGS: Chloroform extract of *Psidium guajava* seed, ME-PGS: Methanol extract of *Psidium guajava* seed, EE-PGS: Ethanol extract of *Psidium guajava* seed

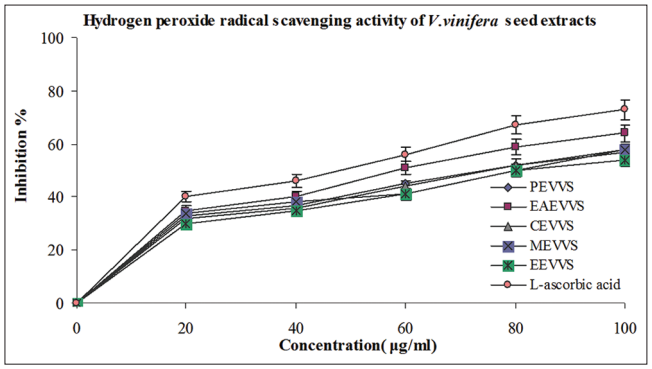

Fig. 9: Inhibitory effect of *Vitis vinifera* seed extracts against H_2O_2 radical. PEV-VS: Petroleum ether extract of *Psidium guajava* seed, EAE-VVS: Ethyl acetate extract of *Psidium guajava* seed, CE-VVS: Chloroform extract of *Psidium guajava* seed, ME-VVS: Methanol extract of *Psidium guajava* seed, EE-VVS: Ethanol extract of *Psidium guajava* seed

Hydroxyl atoms in biological system, which are among the most reactive species, are known to be extremely damaging, and hence, many plants have antioxidant activities that are useful for health [34]. In this finding, the antioxidant potential of a compound is attributed to the salvaging activity of these atoms as best precursors [35].

There is a perfect correlation among the antioxidant activity (DPPH, TPC, total flavonoid content, ferrous reducing power, and hydrogen peroxide radical scavenging), aiding the idea of polyphenols as a fundamental power of the antioxidant and anticancer properties of fruit seed extracts. Evaluation needs to be done, extensively to isolate the *in vitro* antioxidant compounds or to determine the biological activity of these extracts [36].

CONCLUSION

In the fruit juice industry, the seeds of various fruits are thrown as waste, disposing the fruit waste leads to the higher cost, and environmental damage during the land-fills. From the discharge, the collected seeds of *P. granatum*, *P. guajava,* and *V. vinifera* have been explored in a useful manner to treat them against reactive oxygen species. The ethyl acetate extracts of *P. granatum*, *P. guajava,* and *V. vinifera* seeds contain higher phenolic and flavonoid content and high free atom salvaging inhibitory properties compared to other chemical extracts of selected seeds. Among the three selected seeds, *P. granatum* seed contains more phytoconstituents, high phenolic and flavonoid contents, and high antioxidant potential. The antioxidant inhibitory potentials of the selected seeds are ranked as *P. granatum*>*P. guajava*>*V. vinifera.*

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AUTHORS' CONTRIBUTIONS

Author YAS designed the work and modified the required correction in the manuscript; NSS executed the research work and written the manuscript.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests and also there are no conflicts of interest among them.

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