Bioactive compounds and Antioxidant capacity from different fruit extracts of Aonla (*Emblica officinalis* Gaertn.)

ABSTRACT

Aonla (*Emblica officinalis* Geartn.) possess significant nutraceutical properties which is distributed throughout the semi-arid region of northern Madhya Pradesh, Rajasthan, plains of Uttar Pradesh, valley of Himalayas and tropical southern part of India. Aonla is also called as Indian Gooseberry which is nutraceutical rich and also utilized in ayurvedic preparations. The study has been done to access the nutraceutical potential of Aonla from different extracts of fruit pulp powder of a local cultivar. Different extracts of fruit pulp powder *i.e.,* in pure methanol, 80 % ethanol and Ethanol: Ethyl Acetate: Water (4:3:3) were prepared and analyzed for their bioactive compounds and antioxidant capacities. The local cultivar contains a good amount of bioactive compounds and exhibit better antioxidant capacities. Results show that the solvent of Ethanol: Ethyl Acetate: Water in ratio of 4:3:3 showed highest quantity of bioactive compounds extraction and antioxidant activity followed by 80% Ethanol in aonla. While pure methanol was found best for extraction yield and tannin content.

Keywords: DPPH, FRAP, fruit extracts, Indian Gooseberry, nutraceutical, *Phyllanthus emblica*

1. INTRODUCTION

Aonla (*Emblica officinalis* Gaertn), also called as Indian gooseberry, is a valuable fruit crop of Indian origin grown in all parts of country in diverse agro-climatic conditions. It is used in Ayurvedic medicine for making Triphala and Chyavanprash. Owing to its hardy nature, high productivity, nutritive and therapeutic values, and its suitability for various kinds of value-added products. The fruit is useful against several ailments, and can be made into various value-added products. Fruit is also used to prepare aonla powder, which is superior to synthetic vitamin C in treating deficiencies [1]. Aonla is rich in nutritional properties, contains very high Ascorbic acid as well as other health promoting compounds. Local cultivar or indigenous type of aonla are rich in nutritional and medicinal aspects. Extraction of fruit bioactive compounds for determining its nutraceutical potential is important in its profiling. Generally, extraction is performed with various solvents, some solvents are capable of extracting different bioactive compounds. For nutraceutical profiling, most suitable solvent is always required for the extraction of bioactive compounds in a better amount. In view of this and nutritive importance of local aonla type and potential of various solvents for bioactive compounds extraction, the study was done to choose best solvent for better bioactive compounds extraction for the purpose of nutraceutical profiling for local aonla type [13,14].

2. MATERIAL AND METHODS

Local Aonla type was taken for the study from the Gwalior region which is located at 26˚ 13' N latitude and 78˚ 14' E longitude at a height of 211.5 meters above the mean sea level in the Gird Agro-climatic region of Madhya Pradesh, India.

2.1 Collection of Fruit Samples

Fully mature fruits were collected from the Aonla Orchard during February, 2022. They were thoroughly washed under tap water to remove dust & impurities and segments were cut and separated from the capsules with the help of knife.

2.2 Drying and Preparation of Fruit Pulp Powder

Fruit pulp was freeze dried. For freeze drying, fruit pulp segments were kept at -40 °C for 5 hours and the freeze dried at -50 °C and 52 Pa pressure for 22 hours. The dried pieces were grinded to fine powder and filtered using muslin cloth. The powder was kept under plastic sealed bags and stored at 4 °C until the analysis.

2.3 Extraction of Bioactive compounds

Extraction was done in three different solvents-

1. Pure Methanol
2. 80% Ethanol
3. Ethanol: Ethyl Acetate: Water (E:EW:W) in ratio 4:3:3

Extraction procedure:

10 g dried fruit pulp powder was dissolved in 100 ml solvents and allowed to shake in shaker for 24 hours, the extract was filtered. The filtered extract was allowed to evaporate in air drier at 30 °C and the crude dry extract of bioactive compounds was obtained and weighed. This extract was dissolved in 10 ml of respective solvents.

2.4 Biochemical analysis

Extraction yield was recorded after extract was filtered and then evaporated; the crystal form of compounds remain was weighed in milligram. Tannin content was determined by Folin Danis reagent method as per the procedure given by Ruck [2] and Rangana [3] using tannic acid as standard and expressed in milligram per 100 grams of sample (mg /100g). Total Phenols was determined by the Folin-Ciocalteu method [4] where gallic acid was used as standard and expressed as mg gallic acid equivalent per 100 grams of sample (mg GAE/100g). Total Flavonoids was determined by Aluminium chloride method using quercetin as a standard [5] and expressed as mg quercetin equivalent per 100 grams of sample (QE mg/100g). Alkaloids was estimated by bromocresol green method suggested by Ajanal [6] using alkaloid as standard and expressed in milligram alkaloid equivalent per 100 grams of sample (AE mg/100g). Ascorbic acid (Vitamin C) content of the sample was analyzed by using 2, 6- dichlorophenol indophenol dye method as described by Rangana [3] and represented in mg per 100g. DPPH radical scavenging activity of extracts was estimated as per the procedure of Alothman [7]; an aliquot (100 µl) of fruit extract was mixed with 3.9 ml of 0.1 mM DPPH methanolic solution. The mixture was thoroughly vortexed and incubated at ambient temperature in the dark for 35 minutes. The absorbance at 517 nm was measured along with control (only DPPH solution) and blank (only methanol) with ascorbic acid as standard. Results were expressed as percentage of inhibition of the DPPH radicals.

2.5 Data analysis

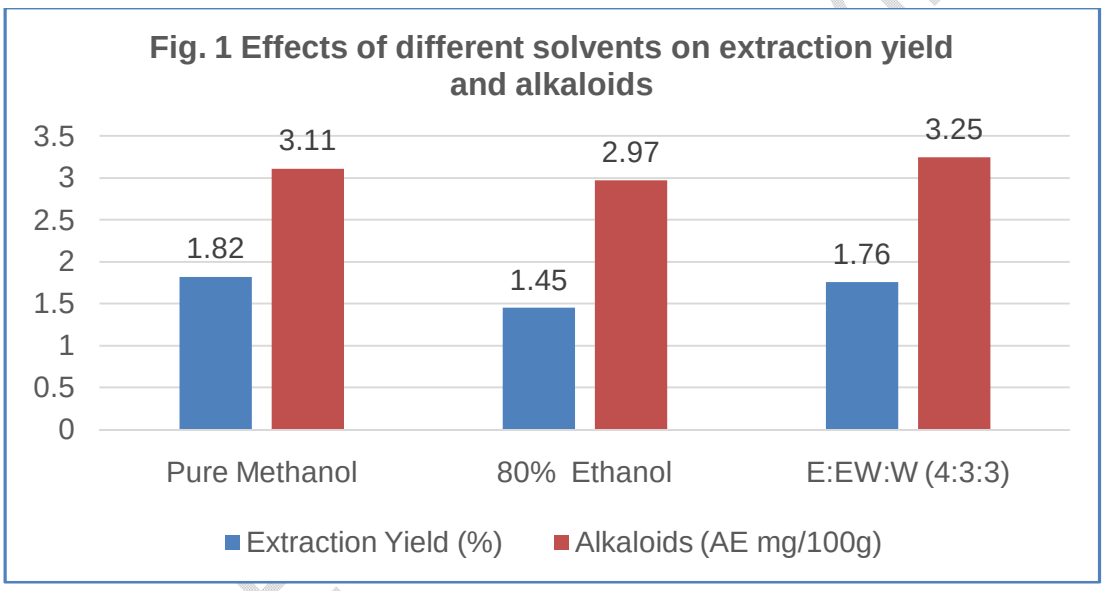
Data analysis was done via., one-way ANOVA, F-test was performed to test the significance.

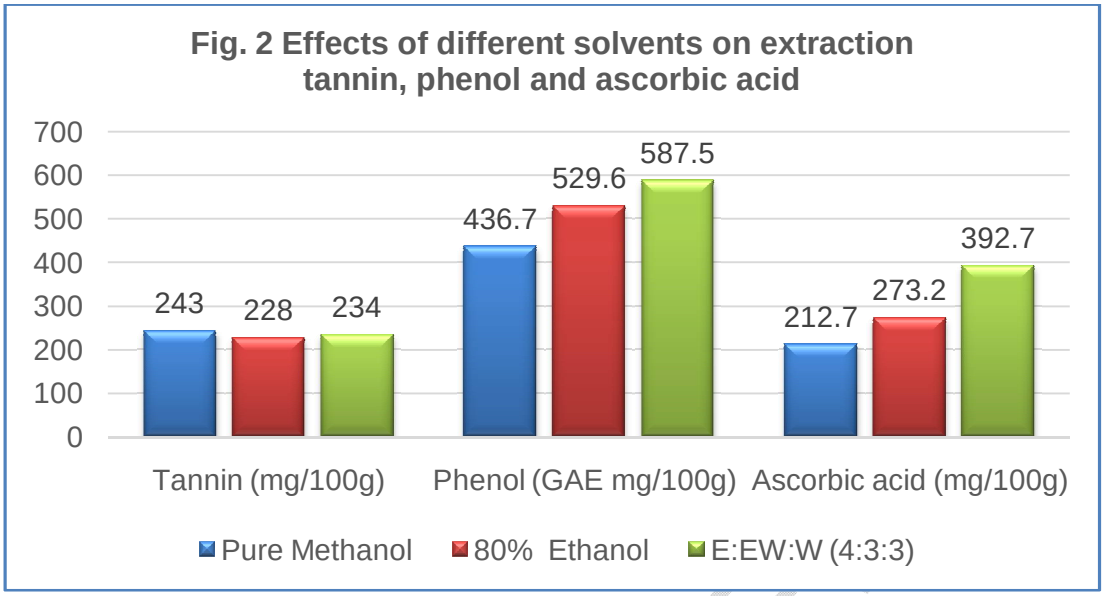
3. RESULTS AND DISCUSSION

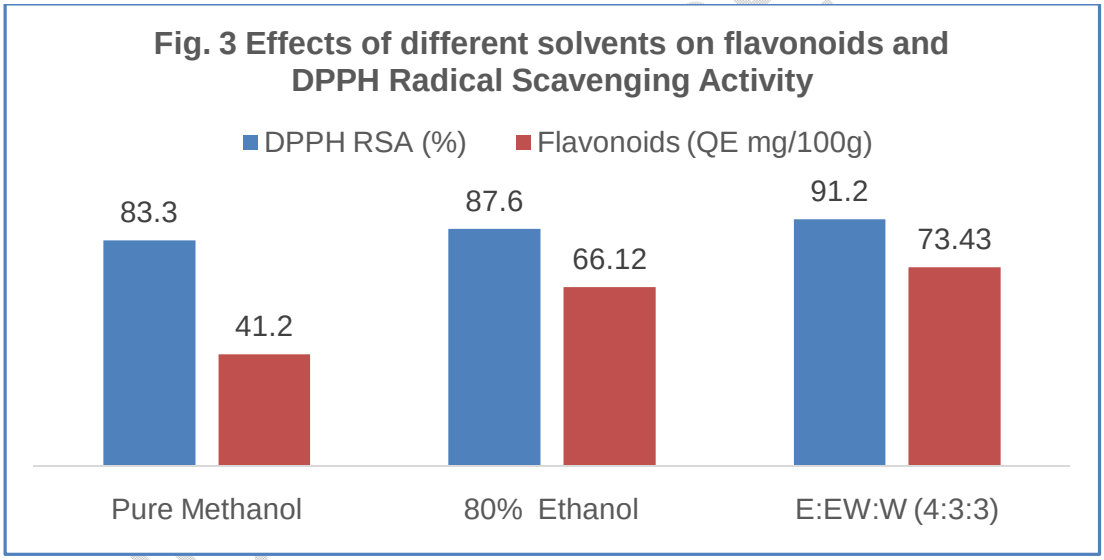
The data analysis revealed that different aonla extract significantly ($p< .05$) affected the bioactive compounds extraction (Fig. 1, 2 and 3). The local cultivar contains a good amount of bioactive compounds and exhibit better antioxidant capacities.

Results show that extraction yield (1.82 %) and tannin content (243 mg/100g) was maximum with pure methanol followed by Ethanol: Ethyl Acetate: Water (4:3:3). However, highest amount of total phenols (587.5 GAE mg/100g), total flavonoids (73.43 QE mg/100g), alkaloids (3.25 AE m/100g) and ascorbic acid (392.7 mg/100g) was found with extract of Ethanol: Ethyl Acetate: Water (4:3:3) followed by 80 % ethanol except for alkaloids which was in pure methanol. Similarly, ethyl acetate fraction recorded with highest phenolic contents by Liu [8].

DPPH radical scavenging activity (91.2%) was also maximum with Ethanol: Ethyl Acetate: Water (4:3:3) followed by 80% ethanol (87.6 %). Aqueous and ethyl acetate fraction also reported with high phenolic content and DPPH radical scavenging activity by Liu [8]; Luo [9]; Charoenteeraboon [10]. The possible reason that Ethanol: Ethyl Acetate: water (4:3:3) was found effective in bioactive compounds extraction because each three fractions, *viz.,* ethanol, ethyl acetate and water extracted maximum compounds from the pulp powder as compared to the other solvents. Similar results were also observed by Liu [8]; Luo [9]; Elangoven [11]; Luqman and Kumar [12].







4. CONCLUSION

Local type of aonla showed with better nutraceutical potential. The solvent of Ethanol: Ethyl Acetate: Water in ratio of 4:3:3 was reported best for bioactive compounds extraction and depicting antioxidant activity, followed by the solvent of 80% Ethanol was observed better for extraction in aonla. While pure methanol was found best for extraction yield and tannin content.

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