Comparative Antioxidant Activity of Methanolic Extracts of Swertia chirayita (Aerial Part) & Freshly Collected Aloe vera gel

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Abstract

The research was conducted to find out and compare the antioxidant activity of the methanolic extracts of aerial part of Swertia chirayita (MES) (Family: Gentianaceae) & freshly collected Aloe vera gel (AVG) (Family:Asphodelaceae).DPPH free radical scavenging assay, Total antioxidant capacity, Total phenolic content, and Total flavanoid methods were used to explore the antioxidant capacity of S. chirayita (MES) & A. vera (AVG). Antioxidant activity test of the crude extracts were assessed by different methods against standards. In DPPH free radical scavenging method A. vera (AVG) showed significant antioxidant potentiality with the IC50 value of 27.36 µg/ml than S. chirayita (MES) whose IC50 value was 38.16 µg/ml. Among the two extracts, better phenolic content was found in methanolic extract of S. chirayita (MES) (1176.8 mg of GAE/gm) than A. vera (AVG) (84.25 mg of GAE/gm) gel. Total antioxidant capacity obtained was better in S. chirayita (MES) with value of 160.76 mg of GAE/gm than A. vera (AVG) gel (138.19 mg of GAE/gm). The flavonoid content in S. chirayita (MES) has been found to be better (409.25 mg of GAE/gm) than A. vera (AVG) gel (123.85 mg. of GAE/gm). The results confirmed that due to significant antioxidant properties the extract of S. chirayita (MES) and Aloe vera (AVG) gel may have potential phytomedicine value.

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Keywords: *Swertia chirayita; Aloe vera;* antioxidant; total phenolic content; total antioxidant capacity; total flavonoid etc.

Introduction

For thousands of years, nature has been a resource for therapeutic agents and an admiral number of modern medicines have been discovered, mostly based on their use in conventional medicine, from natural sources. Highly reactive free radicals are key cause for lipid per oxidation. A large range of psychiatric conditions are accountable for free radical oxidative stress (Birben et al., 2012). Oxidative stress causes severe imbalance in free radicals production and the antioxidant defense mechanism of the body (Nakiboglu et al., 2007). By squashing the development of reactive oxygen species (ROS), antioxidants exercise their mode of action (Subhashini et al., 2011). *S. chirayita* (MES) common name as "Chiretta", a traditional Ayurvedic herb belongs to the Gentianaceae family is used for several medicinal purposes. Traditional plants take part in a very imperative job in preventing and treating digestive, hepatitis and inflammation diseases. (Bhatt et al.,2006). Chirayita contains glycoside like compounds amarogentin (chirantin) (Arino et al., 1997), Amaroswerin (Niiho et al., 2006), swertiamarin (Arino et al., 1997) monoterpene, alkaloid like gentianine (Tabassum et al., 2012), xanthone swerchirin (Bhattacharya et al., 1974), mangiferin (Tabassum et al., 2012), lignin, triterpenoids and pentacyclic triterpenoids (Chatterjee & Pakrashi, 1995) .

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Aloe vera (AVG) belong to the family aspodelaceae is cultured for farming and remedial uses. Aloe *vera* gel are shown to possess polysaccharides like glucomannan and acemannan carboxypeptidase, magnesium, zinc, calcium, glucose, cholesterol, salicylic acid, prostaglandin precursors (gamma-linolenic acid), vitamins A, C, E, lignins, saponins, plant sterols and amino acids. Anthelmintic, cathartic, carminative, depurative, diuretic, stomachic, and emmenagoge are shown in *Aloe vera* . Juice is utilized as a part of healthy skin prescription, dyspepsia, amenorrhea, smolders, colic, hyperdenosis, hepatopathy, stomach, tumors, sciatica, lumbago and flatulence. For ulcerative colitis and pressure ulcers *Aloe vera* gel is very useful (Christaki & Florou-Paneri, 2010). In the cosmetic and toiletries sectors , *Aloe vera* has been commonly used such as moisturizers, sun lotions, cleansers, toothpastes, mouthwashes, deodorants , shaving creams, and shampoos (Christaki & Florou-Paneri, 2010).

The present study was therefore intended to measure up to the antioxidant activity of methanolic extracts of S. chirayita & A. veragel which is grown in Bangladesh.

Materials and Methods

Collection of Plant Materials

The aerial aspects of *S. chirayita* (MES) & A. vera (AVG) gel, in August, 2018 were collected and recognized by an expert taxonomist of Bangladesh National Herbarium, Mirpur, Dhaka. Two voucher specimens were submitted to the herbarium having accession number DACB: 47070 for Swertia chirayita and DACB: 47071 for Aloe vera .

Aerial elements of *S. chirayita* (MES) were then washed correctly and sun dried for several days. These were then dried in an oven for 24 hours at considerably low temperature for better grinding and ground into a coarse powder. As we worked with fresh Aloe extract, the drying and evaporation process of A. vera (AVG) was not needed. When we worked with the extract of Aloe, we have collected fresh plants every time and by peeling the leaves we collected the juice from it.

Preparation of Plant Material

Powdered plant materials (aerial parts) of S. chirayita (400gm) was taken in an amber colored reagent container and soaked in 1.5 liters of methanol. The bottle with its contents was sealed and stored with periodic shaking and stirring for duration of about 12 days. The entire blend was then filtered through cotton and then through Whatman No.1 filter papers and concentrated with a rotary evaporator to provide crude extract at a temperature under reduced pressure.

Antioxidant Activity Test

DPPH (1, 1-Diphenyl-2-Picrylhydrazyl) Free Radical Scavenging Activity

Basis on the scavenging activity of the stable 1, 1-diphenyl-2-picrylhydrazyl(DPPH) free radical , the antioxidant potential of the extracts was determined. The DPPH assay was carried out according to the procedure described by Fresin (Feresin et al., 2002). Ascorbic acid was taken as standard.

Determination of Total Phenolics

Total phenols were determined by means of Folin-Ciocalteu reagent (Feresin et al., 2002). Gallic acid was taken as standard.

Determination of Total Antioxidant Capacity

Total antioxidant capacity of the extracts of S. chirayita (MES) & A. vera (AVG) gel was determined by the method of Prieto et al. (Prieto et al., 1999). Gallic acid was taken as standard.

Determination of Total Flavonoids

Total flavonoid content of different extracts was determined by colorimetric method of aluminum chloride (Shi et al., 2012). As standard, Gallic acid was taken and the extractives flavonoid content was uttered as mg of gallic acid equivalent/gm of dried extract.

Results

DPPH (1, 1-diphenyl-2-picrylhydrazyl) Free Radical Scavenging Activity

The antioxidant activity of *S. chirayita* (MES) and A. vera (AVG) was evaluated by DPPH radical scavenging assay. It is evident from our performance that S. chirayita and A. vera have a DPPH radical scavenging operation. Between them, A. vera (AVG) (IC50 = 27.36 µg/ml) showed better DPPH radical scavenging than *S. chirayita* (MES) (IC50 =38.16 µg/ml). Figure1.1. provides the results of DPPH radical scavenging assays of MES, AVG and ascorbic acid (standard).

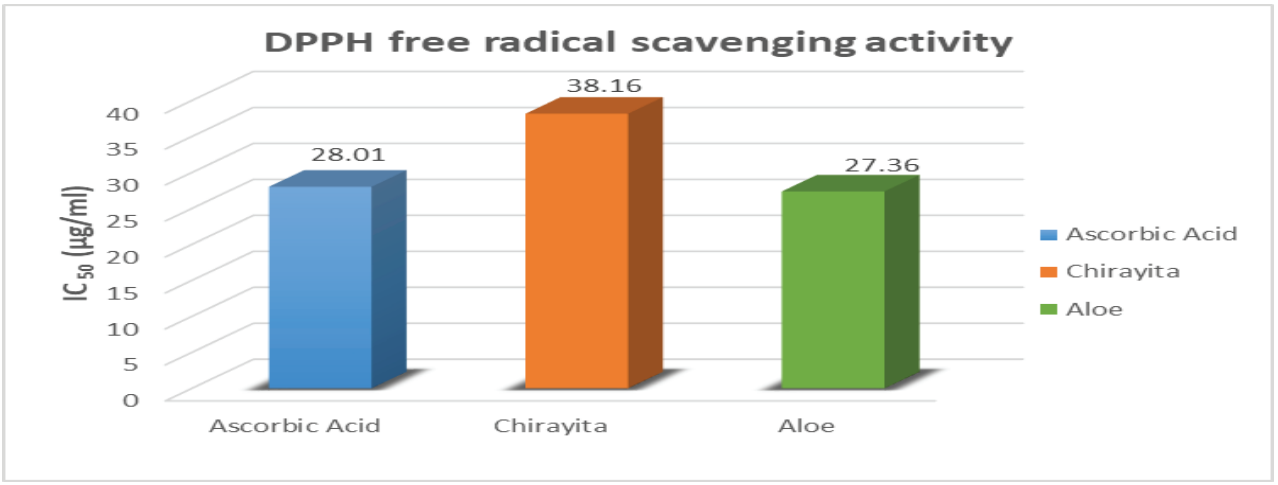

Figure 1.1: IC_{50} value of the standard, *S. chirayita* & A. vera

Determination of Total Phenolic Content

Basis on the normal curve for gallic acid, Phenolic content of MES and AVG were computed. Better phenolic content was found in methanolic extract of S. *chirayita* (MES) than *A.vera* (AVG) gel.MES had the highest phenolic content at concentration of 25 µg/ml whereas AVG had the highest phenolic content at 200 µg/ml concentration in accordance with GAE/gm of dried sample as revealed in figure 1.2.

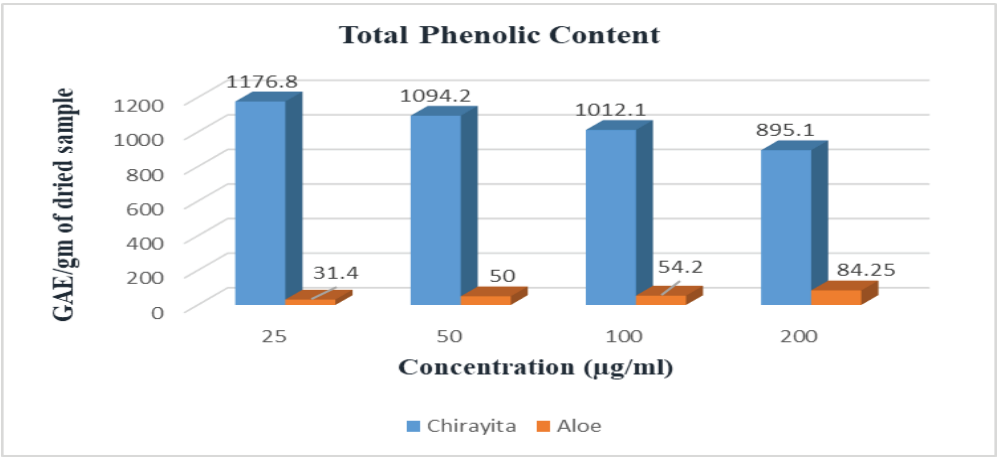

Figure 1.2: Total phenol content of *S. chirayita & A. vera*

Determination of Total Antioxidant Activity

Total antioxidant capacity of the methanol extract of *S.chirayita* and freshly prepared A. vera juice was determined using the phosphomolybdenum method. The findings were expressed as mg of Gallic acid (standard) equivalent (GAE)/gm of dried extractives. Better antioxidant capacity was found in methanolic extract of *S. chirayita* (MES) than *Aloe vera* (AVG) juice wherein MES had the highest antioxidant capacity at concentration of 25 (µg/ml) and AVG had the highest antioxidant capacity at 100 µg/ml concentration in accordance with GAE/gm. of dried sample shown in the figure1.3.

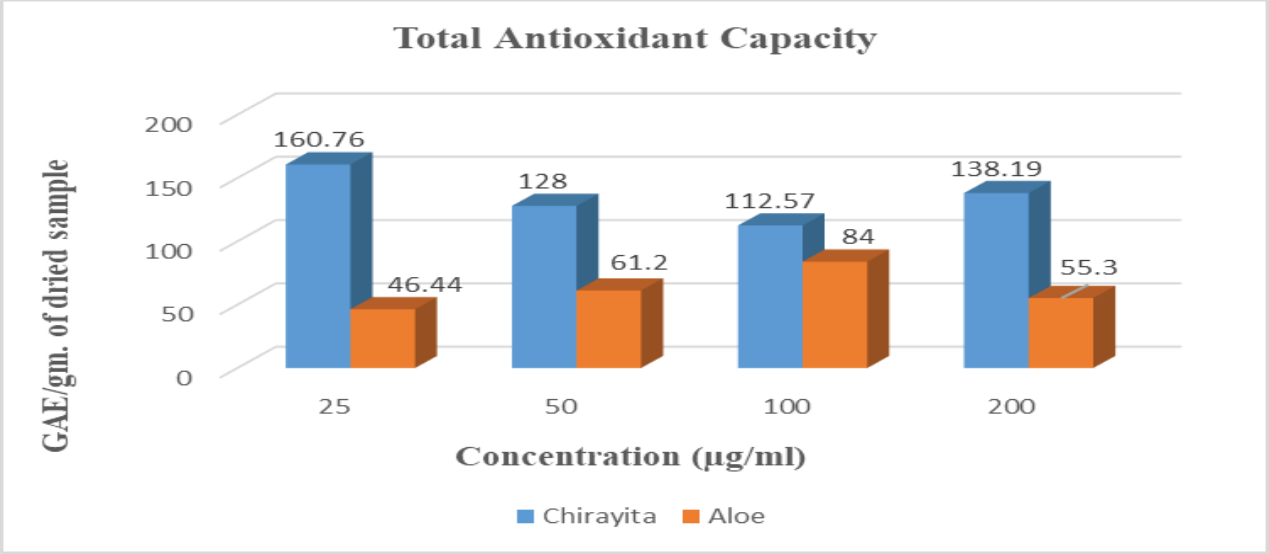

Figure 1.3: Total antioxidant capacity of *S. chirayita* and *A. vera*

Determination of Total Flavonoid Content

Better flavonoid content among this two extracts was found in methanolic extract of *S.chirayita* (MES) with a of content of 409.25 GAE/gm than *Aloe vera* (AVG) juice with a of content 123.85 GAE/gm at a concentration of 200 µg/ml reported in the figure 1.4.

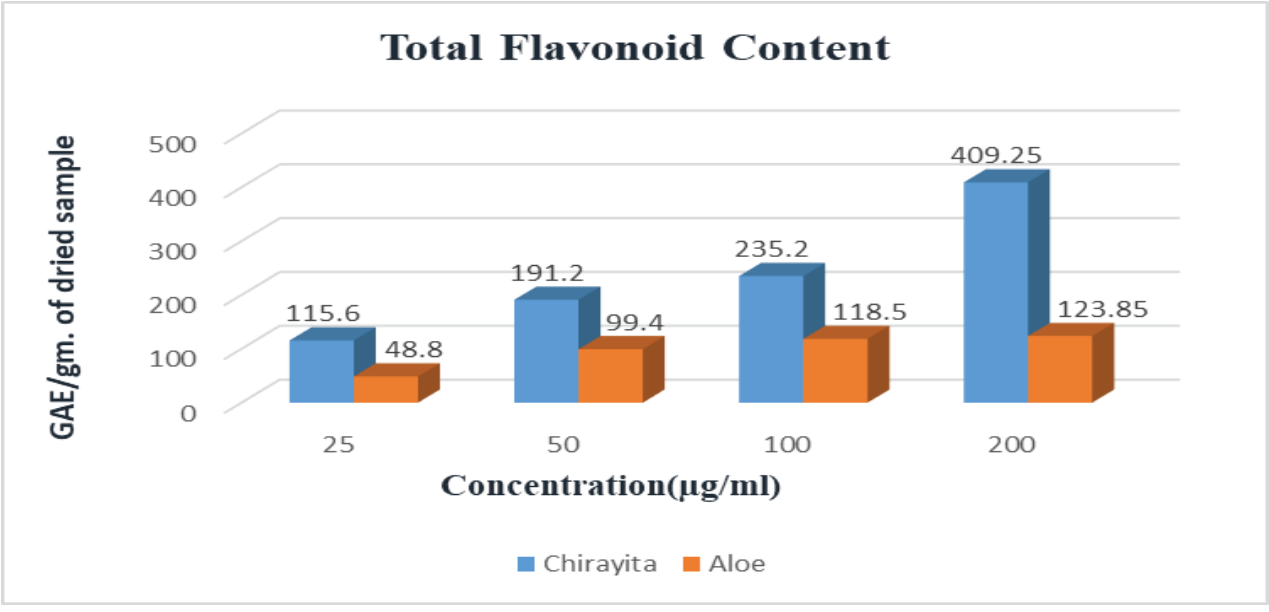

Figure1.4: Total flavonoid content of *S. chirayita and A. vera*

Conclusion

As indicated by the literature review, the presence of several phytochemical compounds in both of the plants *S. chirayita* (MES) & *A. vera* (AVG) have made the plants pharmacologically active. Based on the results of our study it can be concluded that the methanolic extract of *S.chirayita* (MES) & *A. vera* (AVG) juice possess significant anti-oxidant. S. chirayita (MES) shows better total phenolic content, total antioxidant capacity and total flavonoid content than A. vera (AVG) whereas, *A. vera* shows better DPPH free radical scavenging activity than *S. chirayita* (MES). In conclusion it can be revealed that the extract of *S. chirayita* (MES) & *A. vera* (AVG) juice possess significant antioxidant activities. However the search for active principles responsible for these activities requires extensive research.

Declaration of Competing Interest

None declared.

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None.

Ethical Approval

Not required.

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