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Research Article

Evaluation of phytochemical and antioxidant contents of *Mesua ferrea, Hemionitis arifolia* and *Pimenta dioica*

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ABSTRACT

The current study was undertaken to find the antioxidant value of certain medicinal plants. Antioxidants have been reported to prevent oxidative damage caused by free radical and can be used in cardiovascular, anti-inflammatory and anti-ulcer diseases. The amount of total phenols, flavanoids and radical scavenging activity has been studied. Major amount of phenols and radical scavenging activity were determined in *Mesua ferrea* followed by *Pimenta dioica* and *Hemionitis arifolia*. Moreover, maximum flavonoid content was found to be present in the *Mesua ferrea* and *Hemionitis arifolia* then followed by *Pimenta dioica*.

Key Words: Antioxidant, Medicinal Plant, *Hemionitis arifolia*, *Mesua ferrea*, *Pimenta dioica*, Phenol and Scavenging Activity.

INTRODUCTION

Many decades before itself plants have been used throughout the world as source of treatment for various health problems. The indigenous knowledge on medicinal plants is gaining worldwide recognition. Medicinal Plants contain physiologically active principles, which over the years have been exploited in trado-medical practice for the treatment of various ailments [1]. Four thousand years ago, the medical intelligence of the Indian subcontinent was termed as Ayurveda. The literal meaning of Ayurveda is "science of life," which remains an imperative system of medicine and drug therapy in India. The disease evolved in body due to external factors was reported in Ayurveda medicine. It also covered all aspect of diseases, pharmacy and therapeutics in Sanskrit literature [2].

Plant alkaloids are the chief active ingredients of Ayurvedic medicines. Today the pharmacologically active elements of many Ayurvedic medicines are being identified and their usefulness in drug therapy being determined. Medicinal plants have provided a source of inspiration for production of novel drug compounds, as plant derived medicines have made large contributions to human health in historical period[3]. In contrast, there is an increment of herbal products all Phenolics and flavanoids are the major phytochemical compounds which have the ability to exert multiple biological properties such as antioxidant, free radical scavenging abilities, anti-inflammatory, anti-ulcer, anti-carcinogenic, anti-fertility etc[4]. The research on medicinal plant for the purpose of detecting antimicrobial agents from its phytocompounds which have comparatively recent origin and the early investigation in this area focused on those plants that have found application in the age-old practice or their sightless usage as therapeutics for human and animal diseases[5,6]. Phytoconstituents present in some plants such as peptides, alkaloids, essential oils, phenols, coumarines and flavonols which confer antimicrobial

properties that potentially significant therapeutic application against human pathogens, including bacteria, fungi or virus[7].

Recently there has been an upsurge of interest in the therapeutic potentials of plants, as antioxidants in reducing free radical induced tissue injury. Although several synthetic antioxidants, such as butylated hydroxyanisole (BHA) and butylated hydroxyl toluene (BHT), are commercially available, but are quite unsafe and their toxicity is a problem of concern. So there is a trend to substitute them with naturally occurring antioxidants. Natural antioxidants especially phenolics and flavonoids from plant derived drinks (tea, wine etc.) fruits, vegetables and spices are already exploited commercially either as antioxidant additives or as nutritional supplements[8]. With this context, highly remarkable investigations have started worldwide on plants for their antioxidant potential.

MATERIAL AND METHODS

The plant samples of *Mesua ferrea* auct. non Linn. (M. *nagassarium* (Burm.f.), *Hemionitis arifolia* and *Pimenta dioica* were collected from Konny Forest Reserve, Kerala. As per the regular practice of extraction, all the plant samples were individually kept for shade drying till the colour of the plant turned to brown. Following shade drying, leafs of each plants were separately collected and powdered using a mixer grinder. About 10 grams of each plant powder was extracted in 100 ml of methanol by Soxhlet (24 h). The resulting extracts were used for determination of flavonoids, phenols and free radical scavenging activity.

Flavonoids were determined using Aluminum chloride colorimetric method[8]. The calibration curve was made by preparing quercetin solutions at different concentrations in methanol. Total phenols were determined by Folin Ciocalteu reagent[10]. The phenol values are expressed in terms of Gallic acid equivalent. Free radical scavenging activity was determined using the stable 1, 1-diphenyl-2-picryl hydrazyl radical (DPPH) [11]. BHT was used as standard controls. The statistical significance between antioxidant activity values of the extracts was evaluated with ANOVA by using Graph pad prism.

RESULTS

Total phenolic content of the selected plants were measured using the Folin-Ciocalteu method, and the results are shown in Fig .1. The total phenolic content of these plants ranged from 65.82 to 98.15 mg GAE/g. *Mesua ferrea* showed the highest phenolic content (98.15mg GAE/g), followed by *Pimenta dioica* (70 mg GAE/g) and *Hemionitis arifolia* (65 mg GAE/g). Phenolic compounds are plant metabolites, which are characterized by the presence of various phenol groups. A few of them are very reactive in neutralizing free radicals by donating a hydrogen atom or an electron, chelating metal ions in aqueous solutions[12].

Flavonoids are the major class of phyto compounds in plants. The values of flavonoid content varied in each plant such as 56.13 (*Pimenta dioica*), 58.68 (*Hemionitis arifolia*) and the highest value was 69.31 (*Mesua ferrea*).

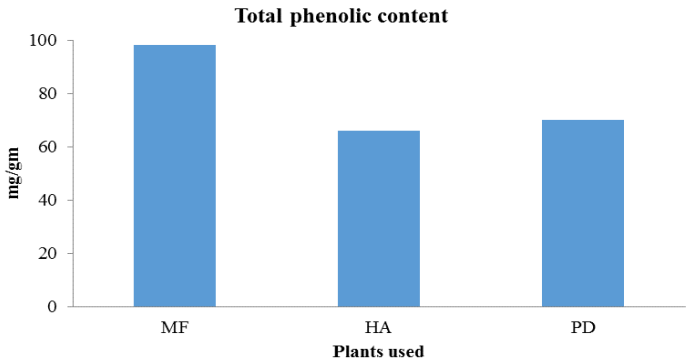
The DPPH radical scavenging percentage for the methanol extracts of *M. ferrea* (MF), *H. arifolia* (HA), *P. dioica* (PD) were plotted in (Fig. 3). The DPPH scavenging capacity of *M. ferrea* was said to have 81±8.37, *H. arifolia* possess 65.7±4.18 and *P. dioica* have 50.7±4.49. The standard (BHT) showed the scavenging activity at a level of 91.8±6.76.

DISCUSSION

The analysis on the selected medicinal plants indicated the presence of high phenolic compounds. It may be due to the presence of tannins and flavonoids which are known to possess antioxidant activities[13]. It has been shown that the scavenging effects on the DPPH radical increases sharply with the increasing concentration of the samples and standards to a certain extent[14] and hence are said to be strongly dependent on the extract concentration.

CONCLUSION

High radical scavenging activity was observed in the *M.ferrea* followed by *H. arifolia* and *P. dioica*. The scavenging activities of the selected plants extracts are less effective than the commercial available synthetic (BHT). The plant extracts are safe and their non toxicity is more important over BHT effects. Hence this study supports the efficiency of tested plants as antioxidant additives or as nutritional supplements for human health.



(MF : *Mesua ferrea*, HA : *Hemionitis arifolia*, PD : *Pimenta dioica*)

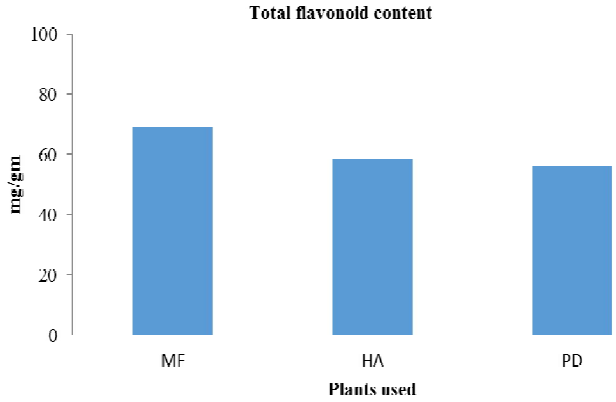


Fig 2. Total flavonoid content of various plants used.
(MF : *Mesua ferrea*, HA : *Hemionitis arifolia*, PD : *Pimenta dioica*)

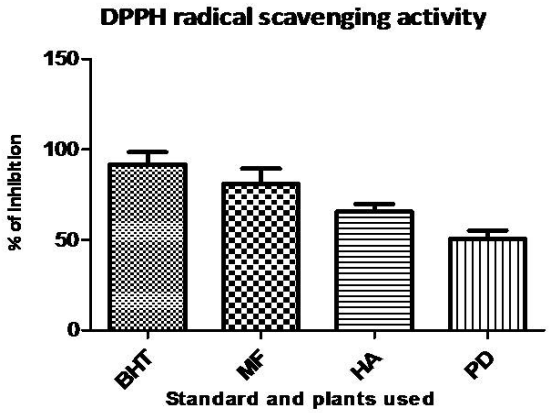


Fig 3. Statistical analysis of scavenging activity of test plants
(BHT : Butylated hydroxytoluene [Standard], MF : *Mesua ferrea*, HA : *Hemionitis arifolia*, PD : *Pimenta dioica*)

Table 1. Statistical analysis of scavenging activity of test plants

Standard and selected plants	Scavenging activity
Standard (BHT)	91.8±6.76
M. ferrea	81± 8.37
H. arifolia	65.7±4.18
P. dioica	50.7±4.49

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