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ANTIOXIDANT ACTIVITY OF *SOYMIDA FEBRIFUGA* ROXB. A. JUSS

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ABSTRACT: In this present study, we investigated the phytochemical constituents screening and *in-vitro* antioxidant activity of hydro-alcoholic (methanol 70%v/v) extracts of *Soymida febrifuga* bark. *Soymida febrifuga* is a huge tree bearing deciduous foliage and having a tough bark belonging to the family Meliaceae. Traditionally the different parts of plant such as root, leaves, bark, and flower are used for various human ailments. The bark extracts are used in treatment of rheumatoid arthritis asthma and good for ulcers .The decoction of the bark has bitter resin used in vaginal infections, rheumatic pains , stomach pains, wounds, dental diseases, uterine bleeding and haemorrhage .The bark is also used as an acrid, refrigerant, laxative, good for sore throat, removes 'vata' and cures 'tridosha' in Ayurveda. Apart from many uses various active constituents like methyl angolensate, luteolin 7-O-glucoside, quercetin, sitosterol, myrecetin were isolated. It also possesses various pharmacological activities such as anticancer, antihelmenthic, antioxidant ant malarial and antimicrobial. In view of this the hydro alcoholic bark extract of *S. febrifuga* produced a dose dependent inhibition of free radical generation of superoxide anion, hydroxyl radical and DPPH radical *In vitro* antioxidant activity.

INTRODUCTION: Herbal medicine was the primary form of medicine and it has been existing from the prehistoric times. About 80% of the world's population, it is not surprising to find in many countries of the world there is a well established system of traditional medicine, whose remedies are still been compiles [1]. A great number of plants worldwide showed a strong antioxidant activity and a powerful scavenger activity against free radicals [2, 3].

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There is an increasing interest in the study of antioxidant substances mainly due to the findings of the therapeutic effects of free radical scavengers on the organism [4]. Therefore, evaluation of Indian traditional medicine is possible through the proper exploitation and exploration of wide biodiversity and great ancient treatises of traditional medicine with the light of modern tools and techniques [5].

In this scenario, *Soymida febrifuga* A. Juss. belonging to the family Meliaceae is an indigenous lofty deciduous medicinal tree found on dry stony hills and on laterite soil endemic to India [6, 7]. The bark extracts of *S. febrifuga* are used extensively in the treatment of leucorrhoea, menorrhagia, dysmenorrhea [8]. Bark is used as rheumatic swellings, oedema, vaginal infections, dental

diseases, uterine bleeding and haemorrhage [9]. This has triggered the authors and the present study was conducted for its phytochemical screening and *In vitro* Antioxidant activity.

MATERIALS AND METHODS:

Plant material: The bark of *Soymida febrifuga* was collected in the month of April 2013 from Sileru, Visakhapatnam district, Andhra Pradesh, India The plant material was taxonomically identified by Dr.Prayaga Murthy Pragada, Botanist, Andhra University, Andhra Pradesh, India. Voucher specimens (BGR/GVP/ Nov2013) have been kept in our laboratory for future reference.

Preparation of hydro alcoholic extract of *Soymida febrifuga*: Freshly collected bark was dried under shade and the dried material was milled to obtain a coarse powder. To the coarse powder (500gms) in a maceration chamber 2.5 litre of methanol (70% v/v) was added and macerated for 5 days at room temperature. The macerated extract was obtained and concentrated under vacuum at temperature of 45°C by using rotary evaporator, dried completely, weighed and stored in a dessicator. The details of extraction are mentioned in **Table 1**.

TABLE 1: DETAILS OF THE EXTRACTION

Plant material	Solvent used	Volume of the solvent	Weight of the extract
Bark (500gms)	Methanol (70%)	2.5litres	42gms

Preliminary phytochemical studies [10-17]: The hydroalcoholic extract of the bark of *Soymida febrifuga* was subjected to chemical tests for the identification of their constituents. A spectrum of natural compounds like triterpenoids, alkaloids, glycosides, steroids, flavanoids, tannins and other similar secondary metabolites, which exert physiological activities are synthesized in the plant, in addition to the carbohydrates, proteins and lipids that are utilized by man as food materials. Different qualitative chemical tests were performed for establishing the profile of a given extract for its nature of chemical composition. The details of constituents which are present in the extract are mentioned in **Table 2**.

TABLE 2: SHOWING PRELIMINARY PHYTO-CHEMICAL SCREENING OF THE EXTRACT OF *S. FEBRIFUGA*

Phytoconstituents	*S. febrifuga* hydro alcoholic extract
Phytosterols	+
Triterpenes	+
Glycosides	+
Saponins	-
Flavonoids	+
Tannins	+
Carbohydrates	+
Alkaloids	+

+ =Present - = Absent

***In-vitro* Antioxidant Activity:** For the assessment of free radicals scavenging activity, hydro alcoholic (70% v/v methanol) extract was dissolved in dimethyl sulphoxide (DMSO) respectively.

Superoxide Radical Scavenging Activity: Superoxide scavenging activity of the plant extract was determined by McCord & Fridovich, 1969 method[18], which depends on light induced superoxide generation by riboflavin and the corresponding reduction of nitroblue tetrazolium.

Hydroxyl Radical Scavenging Activity:

Hydroxyl radical scavenging activity is commonly used to evaluate the free radical scavenging effectiveness of various antioxidant substances [19]. Hydroxyl radical scavenging activity was measured by studying the competition between deoxyribose and the extracts for hydroxyl radicals generated from the Fe^{2+}/EDTA/H_2O_2 sybark (Fenton reaction). The hydroxyl radical attacks deoxyribose, which eventually results in the formation of thiobarbituric acid reacting substances (TBARS).

DPPH Radical Scavenging Activity: The scavenging activity for DPPH free radicals was measured according to the procedure described by Braca *et al*., 2003[20]. In DPPH assay method is based on the reduction of alcoholic DPPH solution (dark blue in color) in the presence of a hydrogen donating antioxidant converted to the non radical form of yellow colored diphenyl-picrylhydrazine. Lower the absorbance higher the free radical scavenging activity [21].

RESULTS AND DISCUSSION:

***In-vitro* antioxidant activity:** In the present study, the hydro alcoholic bark extract of *Soymida febrifuga* was found to possess concentration dependent scavenging activity on DPPH radicals and the results were given in **Table 3**.

TABLE 3: PERCENT INHIBITION OF DPPH RADICAL BY HYDRO-ALCOHOLIC EXTRACT OF *S.FEBRIFUGA* & ASCORBIC ACID

Extract/ Compound	Percentage inhibition of DPPH radical					
	Quantity of extracts/ ascorbic acid in micrograms (µg)					
	20	40	80	160	320	640
Hydro-alc. Extract of *S. febrifuga*	9.7±0.4	15.8±1.1	20.6±0.5	32.7±1.1	56.8±1.2	78.25±1.8
Ascorbic acid	48±0.5	88.08±1.0	90.68±0.3	93.63±0.5	94.21±0.3	94.74±1.1

The values of Percentage inhibition were ranging from 15.3±0.5 to 80.23±2.1.The mean IC_{50} values for DPPH radical of Hydro alcoholic bark extract of *Soymida febrifuga* was found to be 175 µg. The mean IC_{50} value of ascorbic acid was found to be 22µg. The results were given in **Fig. 1**.

The Hydro alcoholic bark extract of *Soymida febrifuga* was found to possess concentration dependent scavenging activity on superoxide generated by photo reduction of riboflavin and the results are given in **Table 4**.

The values of Percentage inhibition were ranging from 12.4±0.5 to 72.5± 1.4.The mean IC_{50} values for superoxide radical of Hydro alcoholic bark extract of *Soymida febrifuga* was found to be 190.5 µg. The mean IC_{50} value of ascorbic acid was found to be 54.4µg. The results were given in **Fig. 2 and 4.**

The Hydro alcoholic bark extract of *Soymida febrifuga* was found to possess concentration dependent scavenging activity on hydroxyl radicals and the results were given **Table 5**.

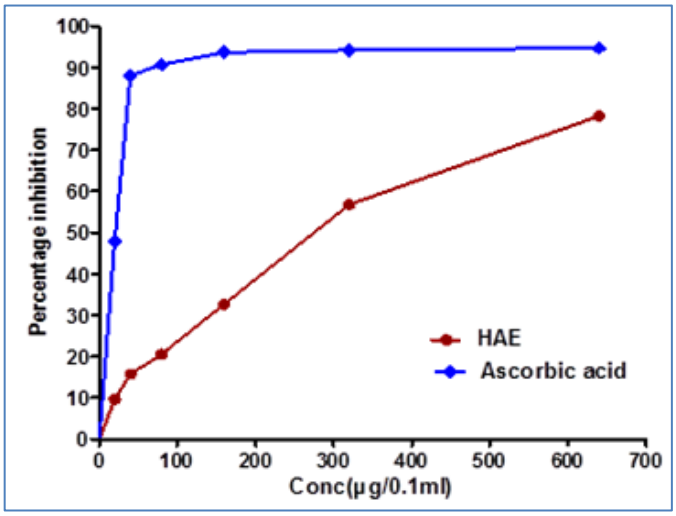

FIG. 1: PERCENT INHIBITION OF DPPH RADICAL BY HYDRO-ALCOHOLIC EXTRACT OF *S. FEBRIFUGA* & ASCORBIC ACID

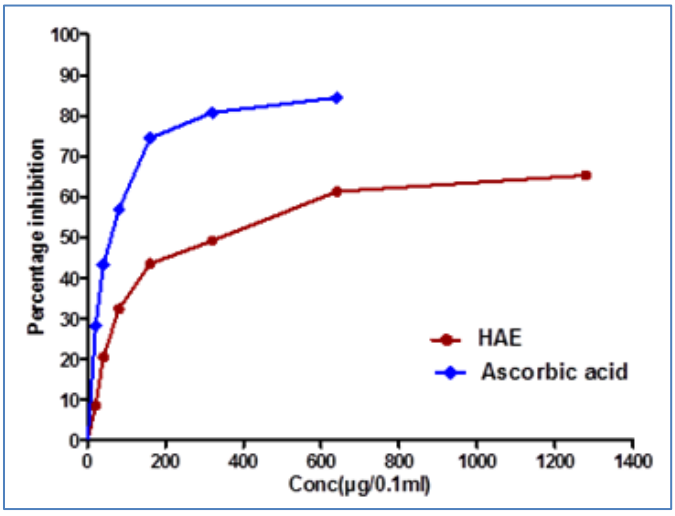

FIG. 2: PERCENT INHIBITION OF SUPEROXIDE RADICAL BY HYDRO-ALCOHOLIC EXTRACT OF *S. FEBRIFUGA* &ASCORBIC ACID

TABLE 4: PERCENT INHIBITION OF SUPEROXIDE RADICAL BY HYDRO-ALCOHOLIC EXTRACT OF *S.FEBRIFUGA*&ASCORBICACID

Extracts/ Compound	Percentage inhibition of Superoxide radical					
	Quantity of extracts/ ascorbic acid in micrograms (µg)					
	20	40	80	160	320	640
Hydro-alc. Extract of *S. febrifuga*	8.5±0.3	20.5±1.0	32.4±1.1	43.51±1.2	49.15±1.2	61.3±0.5
Ascorbic acid	28.15±0.5	43.19±1.5	56.87±1.4	74.46±0.7	80.72±2.1	84.41±1.2

TABLE 5: PERCENT INHIBITION OF HYDROXYL RADICAL BY HYDRO-ALCOHOLIC EXTRACT OF *S.FEBRIFUGA* &ASCORBIC ACID

Extracts/ Compound	Percentage inhibition of Hydroxyl radical					
	Quantity of extracts/ ascorbic acid in micrograms (µg)					
	20	40	80	160	320	640
Hydro-alc. Extract of *S.febrifuga*	15.3±0.5	45.2±1.1	75.12±2.1	81.24±1.3	85.6±1.3	90.2±0.6
Ascorbic acid	24.32±1.0	35.12±0.4	55.61±1.1	65.31±1.2	76.25±1.2	82.11±0.7

The values of Percentage inhibition were ranging from 10.3±0.3 to 67.8±1.6. The mean IC_{50} values for hydroxyl radical of Hydro alcoholic bark extract of *Soymida febrifuga* was found 266.30 µg.

The mean IC_{50} value of ascorbic acid was found to be 68µg. The results were given in **Fig. 3** and **Table 6.**

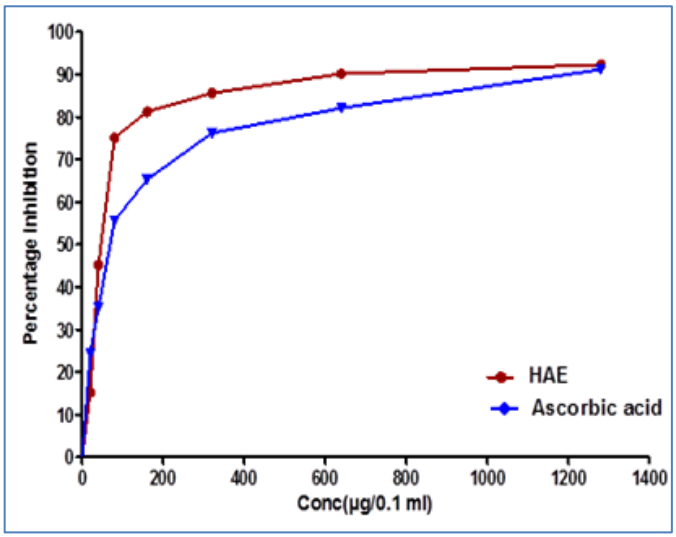

FIG. 3: PERCENT INHIBITION OF HYDROXYL RADICAL BY HYDRO-ALCOHOLIC EXTRACT OF *S.FEBRIFUGA* &ASCORBIC ACID

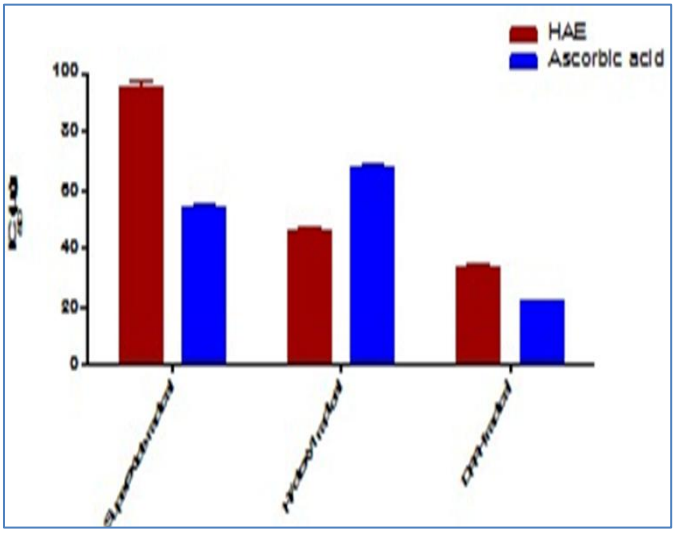

FIG. 4: *IN VITRO* 50% INHIBITION CONCENTRATION (IC_{50}) OF HYDRO-ALC. EXTRACT OF *S. FEBRIFUGA* ON SUPEROXIDE, HYDROXYL AND DPPH FREE RADICAL SCAVENGING ACTIVITY

TABLE 6: *IN VITRO* 50% INHIBITION CONCENTRATION (IC_{50}) OF HYDRO-ALC. EXTRACT OF *S. FEBRIFUGA* ON SUPEROXIDE, HYDROXYL AND DPPH FREE RADICAL SCAVENGING ACTIVITY.

Extract/Ascorbic acid	IC_{50} value (µg)		
	Superoxide radical	Hydroxyl radical	DPPH radical
Hydro-alc. Extract of *S.febrifuga*	190.50±1.20	266.30±1.30	175.00±0.50
Ascorbic acid	54.4±1.1	68.00±1.3	22.0±0.5

CONCLUSION: From the results it can be concluded that the hydro alcoholic bark extract of *Soymida febrifuga* has good antioxidant property. Further studies are warranted to identify and isolate the active principle responsible for its pharmacological activities.

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