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Study of In Vitro Antioxidant Activity of Root Extract of *Parkinsonia aculeate* (Linn)

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ABSTRACT

Parkinsonia aculeate (LINN) is the small spiny tree of Fabaceae family. The present study is to evaluate the antioxidant activity. The root extract of *Parkinsonia aculeate* (LINN) was evaluated for the antioxidant activity. Extraction was carried out by using solvents petroleum ether, chloroform, ethyl acetate, and ethanol. Aqueous extract of root was also used for the evaluation of the activity. The antioxidant activity was studied using DPPH and ferric reducing antioxidant potential (FRAP). In the evaluation of all extracts, the ethyl acetate extract showed significant DPPH radical scavenging activity and ferric reducing potential. From all the extracts, Ethyl acetate extract showed a maximum of 72% of DPPH free radical scavenging activity (130.10 µg/ml IC50 value) and 71.90 % of the ferric reducing power (157.5 µg/ml IC50 value) at 400 µg/ml.

INTRODUCTION

Medicinal plants are used to treat many diseases from ancient times. *Parkinsonia aculeate* is the plant of the Fabaceae family, commonly known as 'Vilayati kikar'. Rotenoids from the *Parkinsonia aculeate* shows the amoebicidal activity [1]. It is the small spiny tree having 4-10 m in height. It is found in the drier parts of India. The bark of this plant is used as an anti-inflammatory agent [2]. Bark is also used as antipyretic. *Parkinsonia aculeate* is found in tropical America [3]. The present work aims to study the antioxidant activity of root extract as there is no reported work on the roots of *Parkinsonia aculeate* (LINN). Free radicals and reactive oxygen species have a role in the pathogenesis of human diseases such as cancer, aging, liver diseases, and atherosclerosis [4]. Leaves of this plant are used as antioxidant [5, 6], hepatoprotective [7, 8], anti-inflammatory [9] and antidiabetic agent [10]. Leaves of this plant also used as antibacterial agent [11]. Phytochemical screening of this plant shows the presence of phytochemicals such as flavonoids, alkaloids, c-glycosides, and saponins. The bark of this plant is used as antidiabetic [12] and analgesic [13]. The essential oil of this plant shows antioxidant and antimicrobial activity [14].

MATERIALS AND METHODS

Plant materials:

The fresh roots of *Parkinsonia aculeate* (Linn) were collected from local areas of Sangola, Solapur and were authenticated by Dr. Tembhurne R. R. Dept. of Botany, Sangola College, Sangola with the help of flora of Solapur District, Maharashtra, India. Roots was dried under shade, coarsely powdered and stored in airtight container for further use.

Chemicals and instruments:

All the chemicals and solvents used in the present study were of analytical grade.

IN VITRO ANTIOXIDANT ACTIVITY

DPPH free radical scavenging activity:

The free radical scavenging potential of *Parkinsonia aculeate* root extracts were tested by using the methanolic solution of DPPH. DPPH is a stable free radical. Antioxidants reduce DPPH to the 2, 2-diphenyl 1-picryl hydrazine which is measured at 517 nm. Ascorbic acid is

used as standard antioxidant. According to the method of brand Williams *et al.* the assay is performed. The reaction mixture used to evaluate this activity contains 0.1 ml of methanolic solution of different extracts (containing 25, 50, 100, 150, 200 and 400µg /ml) and 3.9 ml methanolic solution of DPPH. For standard 0.1 ml of ascorbic acid was used instead of extract. And for blank preparation, 0.1 ml of methanol was used. This mixture was incubated for 30 minute in dark at room temperature. Absorbance measured at 517 nm. Percentage of DPPH radical scavenging activity of all extracts was measured and compared with the standard ascorbic acid [4, 6]. Percentage of the DPPH radical scavenging activity as measured as:

$$\text{Percent inhibition} = \frac{\text{Abs Control} - \text{Abs treated}}{\text{Abs Control}} \times 100$$

Ferric (Fe 3+) Reducing power assay:

This method is described by Vinayakaks *et al.* to study the antioxidant activity. In this assay, Tannic acid was used as standard. In this method, antioxidant compounds forms coloured complex with potassium ferricyanide in the presence of trichloroacetic acid and ferric chloride. In this assay, reaction mixture contain 1 ml of methanolic solution of different extracts (25, 50, 100, 150, 200 and 400 µg /ml) of *parkinsonia aculeate* roots, 2.5 ml of phosphate buffer of pH 6.6 and 2.5 ml of 1 % potassium ferricyanide. This mixture was incubated for 20 min at 50°C, cooled rapidly. Add 2.5 ml of 10 % trichloroacetic acid and 0.5 ml of 0.1 % ferric chloride to each. Blank is prepared by using 1ml of methanol instead of extract solution. Then absorbance was measured at 700 nm. Percentage of Ferric reducing power of all extracts was measured and compared with the standard tannic acid [4, 6]. Percentage inhibition of the ferric reducing power was measured as:

$$\text{Percent inhibition} = \frac{\text{Abs Control} - \text{Abs treated}}{\text{Abs Control}} \times 100$$

RESULTS AND DISCUSSION-

DPPH free radical scavenging activity

Percentage of DPPH free radical scavenging activity of different root extracts of *Parkinsonia aculeate* (LINN) at different concentrations is shown in table No. 1. Percentage inhibition of

all root extracts of *parkinsonia aculeate* is then compared with Percentage inhibition of standard ascorbic acid shown in fig. no. 1 and fig. no. 2.

Table No. 1: Percentage of DPPH free radical scavenging activity of different root extracts of *Parkinsonia aculeate* (LINN)

Sr. No.	Concentration in µg/ml	Percentage of DPPH free radical scavenging activity					
		Petroleum ether	Chloroform	Ethyl acetate	Ethanol	Aqueous	Standard Ascorbic acid
1	25	31.69	30.45	37.1	34.50	27.64	19.54
2	50	32.21	31.16	39.96	35.56	31.50	47.35
3	100	34.85	36.09	44.36	47.35	34.68	69.54
4	150	36.44	41.72	57.92	49.11	35.21	73.06
5	200	37.5	49.29	63.20	52.64	35.73	79.40
6	400	39.43	52.64	72.00	64.26	36.79	85.21
7	IC50	892	310.15	130.10	190.12	1021.05	66.42

Ferric (Fe 3+) Reducing power assay:

Percentage of ferric reducing power of different root extracts of *Parkinsonia aculeate* (LINN) at different concentration are shown in table No. 2. Percentage inhibition of all root extracts of *parkinsonia aculeate* is then compared with Percentage inhibition of standard ascorbic acid shown in fig. no. 3 and fig. no. 4.

Table No. 2: Percentage of ferric reducing power of different root extracts of *Parkinsonia aculeate* (LINN)

Sr. No.	Concentration in µg/ml	Percentage of ferric reducing power					
		Petroleum ether	Chloroform	Ethyl acetate	Ethanol	Aqueous	Standard Tannic acid
1	25	23.82	25.75	29.88	27.68	19.42	31.68
2	50	27.82	29.47	32.09	30.02	23.55	47.38
3	100	32.23	33.47	43.11	34.57	27.27	59.77
4	150	35.12	39.53	57.16	42.01	29.20	73.96
5	200	38.98	41.87	64.04	49.58	32.92	80.44
6	400	42.97	48.76	71.90	58.12	37.87	92.01
7	IC50	498.75	384.74	157.5	269.28	637.55	58.23

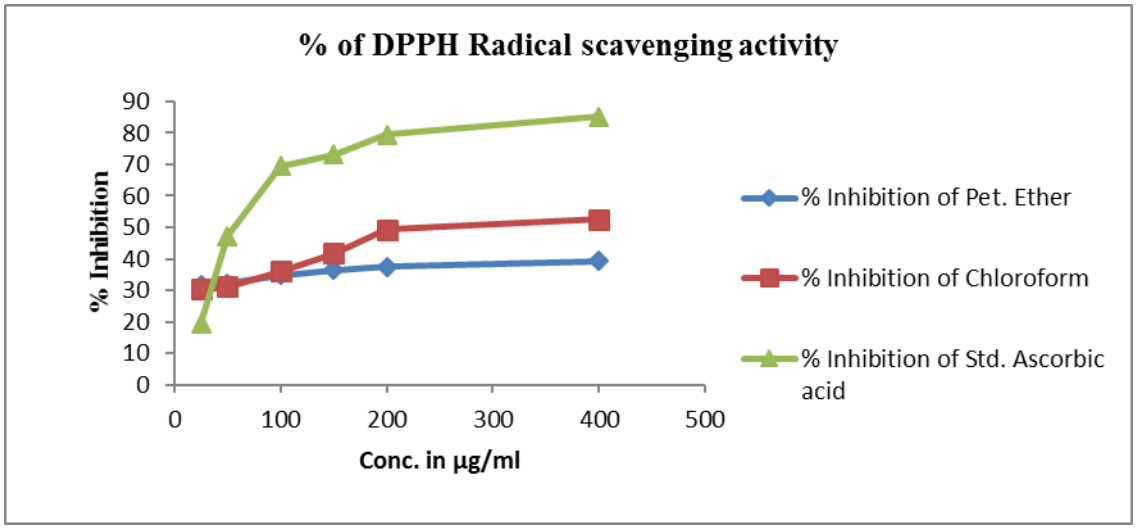

Figure no. 1: DPPH free radical scavenging activity of petroleum ether and chloroform root extract of *Parkinsonia aculeate* (LINN).

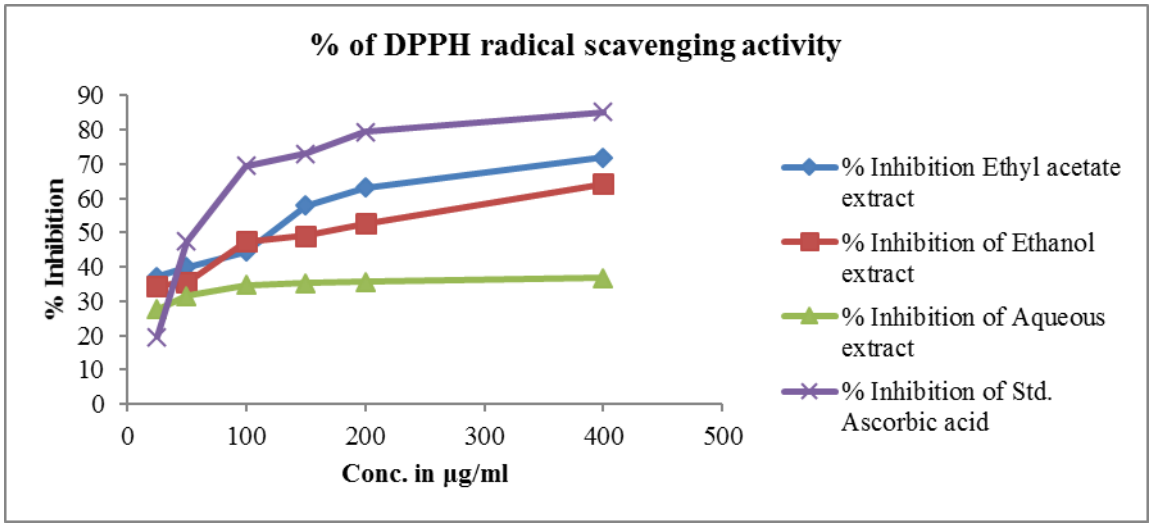

Figure no. 2: DPPH free radical scavenging activity of ethyl acetate, ethanol and aqueous root extract of *Parkinsonia aculeate* (LINN).

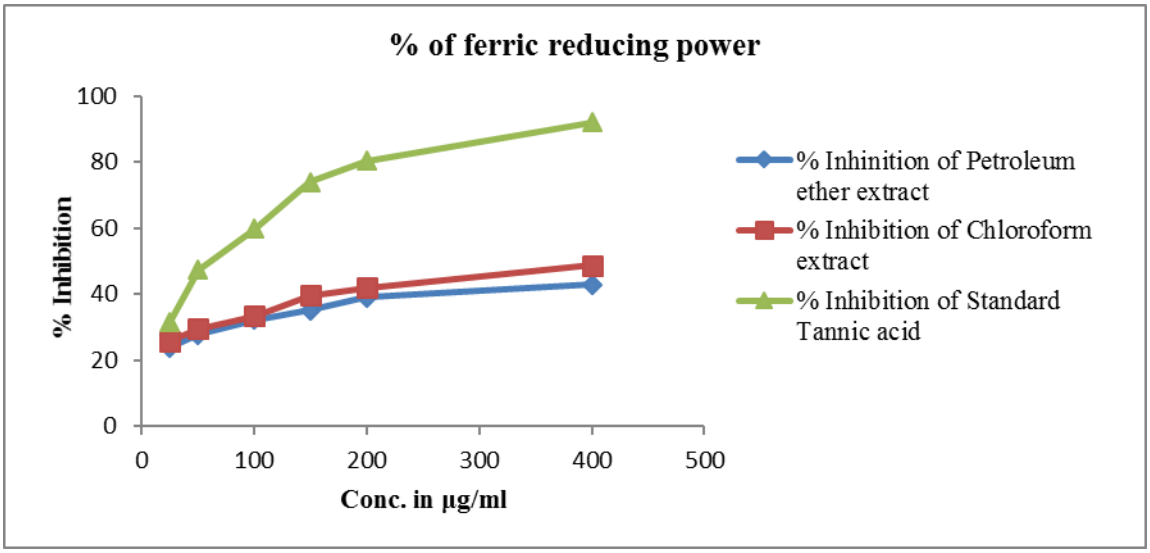

Figure No. 3: Ferric reducing power assay of petroleum ether and chloroform root extract of *Parkinsonia aculeate* (LINN).

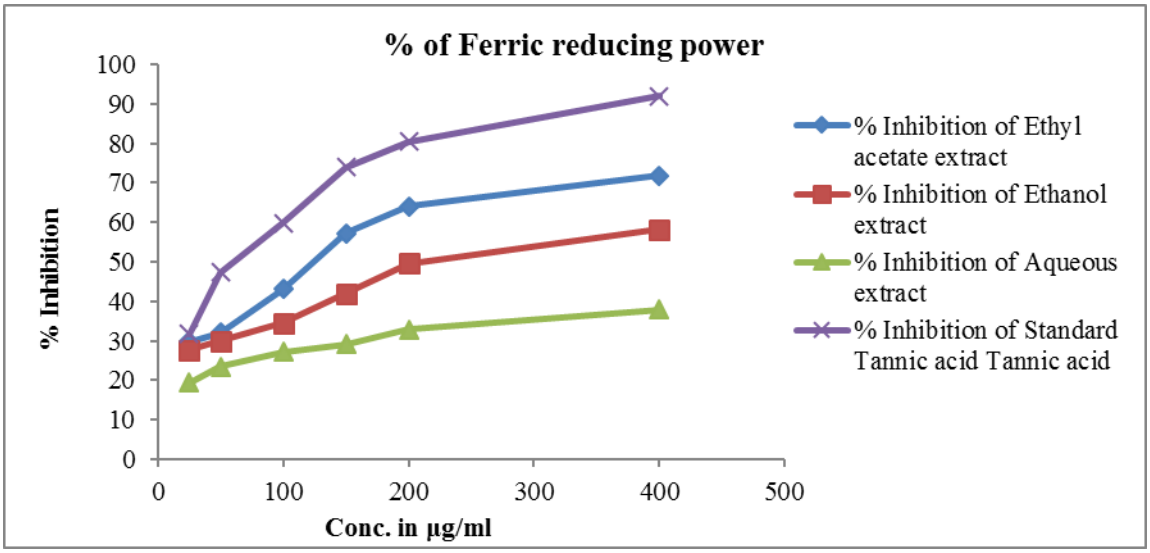

Figure No. 4: Ferric reducing power assay of ethyl acetate, ethanol and aqueous root extract of *Parkinsonia aculeate* (LINN).

CONCLUSION

From the present investigation of in-vitro antioxidant activity, it is concluded that the various root extracts of *Parkinsonia aculeate* shows potential for DPPH radical scavenging activity and ferric reducing potential. In the study of all extracts ethyl acetate extract shows significant DPPH scavenging activity and ferric reducing power. This result is compared with the standard ascorbic acid and tannic acid respectively.

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