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Research Article

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Comparative study upon the antioxidant potential of *Saraca indica* and *Pterospermum acerifolium*

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ABSTRACT

This study aims to evaluate the antioxidant activity (total antioxidant and free radical scavenging activities) of Saraca indica and Pterospermum acerifolium leaves and roots commercially available in the Uttarakhand. The extracts were prepared with ethanol only. The 1, 1-diphenyl-2-picrylhydrazyl (DPPH) assays were used to determine antioxidant properties of Saraca indica and Pterospermum acerifolium by measuring the decrease in absorbance at 470 and 517 nm. The various extract (Pterospermum Acerifolium and Saraca Indica) and Ascorbic acid strongly in scavenge dose dependent manner. IC_{50} value for ascorbic acid, Pterospermum Acerifolium (roots), Saraca Indica and Pterospermum Acerifolium (leafs) and was found to be 26, 41, 45 and 65 µg/ml respectively. The results showed that processed commercial Pterospermum Acerifolium and Saraca Indica exhibited potential antioxidant properties.

Keywords: DPPH, Antioxidants, *Pterospermum Acerifolium* and *Saraca Indica*, Free Radicals

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INTRODUCTION

Antioxidants are substances that may protect cells from the oxidative damage caused by unstable molecules known as free radicals. Free radicals are unstable molecules with unpaired or odd electrons. Free radicals are highly reactive chemicals that attack molecule by capturing electrons and thus modifying chemical structure. Antioxidants are often reducing agent such as thiols, ascorbic acid or polyphenols.

Antioxidants are widely used as ingredients in dietary supplements in the hope of maintaining health and preventing diseases such as cancer and coronary heart diseases. The prefix “anti” means against, in opposition to, or corrective in nature. Within the human body, millions of processes are occurring at all times. These processes require oxygen. Unfortunately, that same life giving oxygen can create harmful side effects, or oxidant substances, which cause cell damage and lead to chronic disease. Oxidants, commonly known as "free radicals", are also introduced through external sources such as exposure to sun or pollution. Other mediums included stress, as well as things that people put into their bodies, such as alcoholic beverages, unhealthy foods and cigarette smoke.

Antioxidants, or anti-oxidation agents, reduce the effect of dangerous oxidant by binding together with these harmful molecules, decreasing their destructive power. Antioxidant can also help repair damage already sustained by cells. Antioxidant enzymes are produced within the body. The most commonly recognized of this naturally occurring antioxidant are Superoxide dismutase, Catalase and Glutathione. Other antioxidant agents are found in foods, such as dark green leafy vegetables. Item high in vitamin A, vitamin C, vitamin E and beta-carotene are believed to be the most beneficial.

Okabe S, Takata Y, Takeuchi K, Naganuma T, Takagi K, (1) in 1976, studied the Effects of carbenoxolone Na (Pterospermum acerifolium) on acute and chronic gastric lesion reduced by NSAIDs drugs in mice. The bark extract of Pterospermum acerifolium is Anti inflammatory and Analgesic in nature as Manna A. K. 2009 (2). The antiulcer property of Pterospermum acerifolium bark extracts was studied by Manna A. K. 2009 **(3).** Murshed S, et.al studied the chronic effects of Pterospermum acerifolium bark on glycemic and lipedemic status of type 2 diabetic model rats Diabetes 2000[4]. The Anthelminthic potential of crude extracts and its various fractions of different parts of Pterospermum acerifolium Linn Sambit Parida (2010) [5]. Shweta Saboo et.al in (2007) [6] evaluated the Antimitotic and Anticancer activity of the crude extracts of wild leaves of Pterospermum acerifolium.

Saraca indica posses the antioxidant and radiation antagonistic as investigated by Rao BS, and Rao N in 2009 [7]. The phytochemical screening and anthelminthic activity of Saraca indica leaf extracts were carried out by Nayak Sarojini and Sahoo in 2010 [8]. The pharmacological evaluation of Saraca indica leaves as a depressant upon central nervous system were shown by A. Verma, G. K. Jana, in 2010 [9]. The Saraca indica linn leaves also possess a pronounced effect upon the uterine activity, Satyavati VG, Prasad ND 1970 [10]. The aqueous suspension of Saraca indica flower also possesses the antiulcer activity against the gastric ulcers as recognized in albino rats, Maruthappan V, Shree SK. 2010 [11]. The bark of Saraca indica linn shows antidepressant activity Prerana S, Krishnamoorthy M, 2008 [12] and the flowers and flower buds are excellent in their antimicrobial and antibacterial property Pal CS, Maiti PA 1985 [13].

EXPERIMENTAL SECTION

Plant material

The fresh plant of the Saraca indica and Pterospermum acerifolium were collected from Dehradun Uttarakhand, India in the month of July to August and the plant was identified and authenticated at Forest Research Dehradun India.

Chemicals and Equipments

All the chemicals used in the investigation were of analytical grade (AR), and were purchased from Sigma Merck etc. Deionized water was used for the complete study. All the glass ware and equipments used were sterilized prior to use. Sterilization process was performed by autoclaving at 121^0C for 15 minutes.

Preparation of extracts

The freshly collected plant of Pterospermum acerifolium and Saraca indica were chopped, shad dried and coarsely powdered. The powder was defatted with petroleum ether (60-80 ^{o}c) then successively extracted with distilled ethanol using Soxhlet extractor. The extracts were dried under reduced pressure using a rotary vacuum evaporator. The percentage yield of flower and root extract of Pterospermum acerifolium and *Saraca indica* plant extract are given below in the table. The extracts were kept in refrigerator for further use.

Table.1. Percentage yield of various extracts

Solvent	*Saraca indica*	*Pterospermum acerifolium (Root)*	*Pterospermum acerifolium (Leaf)*
Ethanol	7%	10%	9%

ANTIOXIDANT ACTIVITY

DPPH Method

DPPH scavenging activity was measured by the spectrophotometric method. A stock solution of DPPH (1.5 mg/ml in methanol) was prepared such that 75 µl of it in 3 ml of methanol. Decrease in the absorbance in presence of sample extract at different concentration (10-125 µg/ml) was noted after 15 min. IC_{50} was calculated from % inhibition.

Protocol for DPPH Free Radical Scavenging Activity

Preparation of stock solution of the sample:-

10 mg of extract was dissolved in 10 ml of methanol to get 1000 µg/ml solution.

(1) Dilution of test solution: 10, 20, 30, 40, 50, 60, 70, 80, 90, 100 µg/ml solution of test were prepared from stock solution.

(2) Preparation of DPPH solution: 15 mg for DPPH was dissolved in 10 ml of methanol. The resulting solution was covered with aluminium foil to protect from light.
(3) Estimation of DPPH scavenging activity: 75 µl of DPPH solution was taken and the final volume was adjusted to 3 ml with methanol, absorbance was taken immediately at 517 nm for control reading. 75 µl of DPPH and 100 µl of the test sample of different concentration were put in a series of volumetric flasks and final volume was adjusted to 3 ml with methanol. Absorbance at zero time was taken in UV-Visible at 517 nm for each concentration. Final decrease in absorbance of DPPH with sample of different concentration was measured after 15 minute at 517 nm.

Percentage inhibitions of DPPH radical by test compound were determined by the following formula.

% Reduction = Control absorbance – Test absorbance/ Control absorbance*100

Calculation of IC50 value using graphical method.

OBSERVATION
Antioxidant activity testing

Table.2. DPPH Free Radical Scavenging Activity of Ascorbic Acid
Absorbance of the sample at 517nm *Absorbance of Control = 0.490*

S.No.	Concentration In (3.3µg/ml)	Absorbance of Ascorbic acid	% Reduction	IC_{50} Value (3.3 µg/ml)
1.	10	0.292	40.63	26
2.	20	0.269	45.90	
3.	30	0.244	50.60	
4.	40	0.226	54.45	
5.	50	0.202	59.10	
6.	60	0.181	63.33	
7.	70	0.162	67.21	
8.	80	0.141	71.45	
9.	90	0.122	75.30	
10.	100	0.088	82.16	

Table.3. Antioxidant Power of Pterospermum Acerifolium (Leaf)
Absorbance of the sample at 517nm *Absorbance of Control = 0.352*

S.No.	Concentration In (3.3µg/ml)	Absorbance	% Reduction	IC_{50} Value (3.3 µg/ml)
1.	10	0.262	25,56	65
2.	20	0.248	29.54	
3.	30	0.232	34.09	
4.	40	0.219	37.78	
5.	50	0.198	43.35	
6.	60	0.180	48.86	
7.	70	0.166	52.35	
8.	80	0.148	57.90	
9.	90	0.138	60.70	
10.	100	0.127	63.90	

Table.4. Antioxidant Activity of ethanol Extract of Pterospermum Acerifolium (Roots)
Absorbance of the sample at 517nm *Absorbance of Control = 0.494*

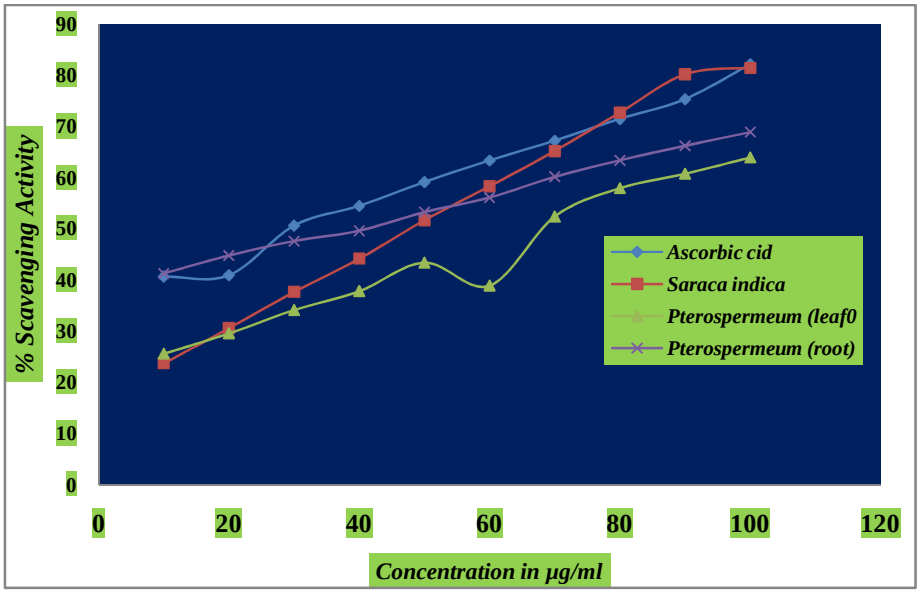
S.No.	Concentration In (3.3µg/ml)	Absorbance	% Reduction	IC_{50} Value (3.3 µg/ml)
1.	10	0.287	41.24	41
2.	20	0.274	44.74	
3.	30	0.259	47.57	
4.	40	0.249	49.59	
5.	50	0.231	53.23	
6.	60	0.217	56.07	
7.	70	0.197	60.12	
8.	80	0.180	63.35	
9.	90	0.167	66.19	
10.	100	0.154	68.84	

Table.5. Antioxidant Activity of ethanol Extract of Saraca Indica

Absorbance of the sample at 517nm Absorbance of Control = 0.494

S.No.	Concentration In (3.3µg/ml)	Absorbance	% Reduction	IC_{50} Value (3.3 µg/ml)
1.	10	0.377	23.68	45
2.	20	0.343	30.56	
3.	30	0.311	37.64	
4.	40	0.276	44.12	
5.	50	0.239	51.61	
6.	60	0.206	58.29	
7.	70	0.172	65.18	
8.	80	0.135	72.67	
9.	90	0.098	80.16	
10.	100	0.072	85.43	

% Free radical Scavenging Activity of various plant extracts and Ascorbic acid by DPPH method



Free radical Scavenging Activity by DPPH method

RESULTS AND DISCUSSION

DPPH is a stable radical that has been used to evaluate the antioxidant activity of plant extracts (*14*). In the current study, DPPH scavenging activity was found in both *Saraca indica* and *Pterospermum Acerifolium* ethanolic extracts. Compared to ascorbic acid the radical scavenging activities of both test samples were similar to those of the reference compounds, and their IC50 values (the concentration required to inhibit radical formation by 50%) ranged from 41, 45 and 65 µg/ml respectively. This indicates that *Saraca indica and Pterospermum Acerifolium* extract has good potential as a source for natural antioxidants. In addition, the ability to scavenge the DPPH radical is related to the inhibition of lipid peroxidation (*15, 16*). As per the result obtained, there is increase in the scavenging ability of extract of various plants with increase in concentration. The DPPH value of various extract obtained relatively better than extract of the plant. As shown in tables the various extract (Pterospermum Acerifolium and Saraca Indica) and Ascorbic acid strongly in scavenge dose dependent manner. IC_{50} value for ascorbic acid, Pterospermum Acerifolium (roots), Saraca Indica and Pterospermum Acerifolium (leafs) and was found to be 26, 41, 45 and 65 µg/ml respectively.

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