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COMPARATIVE STUDY ON ANTI OXIDANT ACTIVITY OF MUSA ACUMINATA (PEEL, LEAF) AND RICINUS COMMUNIS (STEM, SEED)

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Abstract:

Oxidative stress (OS) is the imbalance between cellular production of reactive oxygen species (ROS) and the ability of cells to scavenge them. OS has been implicated as a potential contributor to the pathogenesis of several diseases, such as cancer, diabetes and heart disease[1]. ROS cause the damage of many cellular components including lipids, proteins and nucleic acids, such as DNA leading to subsequent cellular death by modes of necrosis or apoptosis[2]. Antioxidants play an important role to protect damage caused by oxidative stress (OS). Plants having phenolic contents are reported to possess antioxidant properties. The present study was designed to compare the antioxidant properties of methanolic extracts from Musa acuminata (leaf, peel) Ricinus communis (seed, stem). Antioxidant activity of the methyl extracts of the plant extracts were determined by use of Hydrogen peroxide method. The higher the concentration of the extract gave higher free radical scavenging activity. Antioxidant activity of the plant extracts decreased in the order: Musa acuminate peel> Ricinus communis seed > Musa acuminate leaf > Ricinus communis stem. The present study was undertaken to evaluate and compare the antioxidant properties of plant's methyl extracts. Thus, Musa acuminata could be considered as a potential source of natural antioxidants.

Keywords: *Free radical scavenging capacity, Hydrogen peroxide method, phenolic contents, anti oxidant phenolic contents.etc.*

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INTRODUCTION:

Free radicals are atoms or groups of atoms with an odd (unpaired) number of electrons and can be formed when oxygen interacts with certain molecules. Free radicals due to environmental pollutants, radiation, chemicals, toxins, deep fried and spicy foods as well as physical stress, cause depletion of immune system antioxidants, change in gene expression and induce abnormal proteins. Increased free radical formation may produce a continuous level of oxidative damage[3,4], which leads to many diseases such as atherosclerosis, cancer, stroke, asthma, arthritis and other age related diseases[3,5]. However, the generated free radicals are removed from the body through the antioxidant defense mechanisms. Antioxidants are considered as possible protection agents reducing oxidative damage of human body from reactive oxygen species (ROS) and retard the progress of many chronic diseases as well as lipid peroxidation[6]. Therefore, there is a lot of ongoing research on such substances for their potential usefulness as dietary supplements and as adjuvants for use in therapeutic management of free radicals related disorders. Synthetic antioxidants like butylated hydroxy anisole (BHA), butylated hydroxy toluene (BHT), tertiary butylated hydroquinone and gallic acid esters, have been suspected for liver damage and carcinogenesis[7]. Hence, strong restrictions have been placed on their application and there is a trend to substitute them with naturally occurring antioxidants[8,9]. Therefore the importance of searching for and exploiting natural antioxidants, especially of plant origin, has increased greatly in recent years. There is a growing interest in natural additives as potential antioxidants.

The peels of a variety of fruits have gained attention as a natural source of antioxidants and phytochemical content which are rich in compounds with free radical scavenging activity. Banana and castor are major agricultural wastes which have been used as medicine, animal feeds, blacking of leathers, soap making, fillers in rubber and so on [12]. Fruit wastes are highly perishable and seasonal and are a problem to the processing industries and pollution monitoring agencies. This problem can be recovered by utilizing its high value compounds, including the dietary fibre fraction that has a great potential in the preparation of functional foods [13]. Banana peel, an under utilized source of phenolic compounds is considered as a good source of antioxidants for foods and functional foods against cancer and heart disease [14]. The peel of the fruit contains various antioxidant compounds such as gallocatechin [14] and dopamine [13].

MATERIALS AND METHODS:

Apparatus:

Soxhlet apparatus, beakers, china dish, heating mantles, water bath, test tubes, volumetric flask.

Instruments:

U.V double beam spectrophotometer, Make: ELICO, Model: SL-244.

Chemicals:

Methanol, distilled water, buffer pH 6.8, H_2O_2, Ascorbic acid.etc

Collection of Plant Material:

The plants were collected in the month of January from Botanical garden. The plant was then identified by the vernacular names and later it was compared with herbarium of the Department of Botanist.

Processing Of Crude Drug:

The leaves and peel of Musa acuminata, seeds and stem of Ricinus communis were collected and seperated and then dried under shade for 10-15 days. Then the dried materials were grinded and seived to get nearly fine amorphous powder.

Extraction:

Extraction is process of obtaining the constituents by seperating them from crude drug by using solvent (methanol). Powdered materials were extracted with suitable solvent or mixture of solvents for extracting the various phytoconstituents present in the crude drug.

Evaluation of Antioxidant Activity

Hydrogen Peroxide Method

A solution of hydrogen peroxide (20 mM) was prepared in phosphate buffer saline (pH 7.4), different concentrations of plant extract and standard ascorbic acid solution viz. 10, 20, 40, 60, 80 and 100 µg/ml in methanol (1 ml) where added to hydrogen peroxide solution (2 ml). Absorbance of hydrogen peroxide was determined at 230nm after 10 min against a blank. Solution containing phosphate buffer without hydrogen peroxide is used as a blank. For each concentration, a separate blank sample was used for back ground subtraction. The antioxidant activity of the extract was expressed as IC50. All the tests were performed in triplicate and the graph was plotted with the average of three observations.

The percentage inhibition activity was calculated from $[(A0-A1)/A0] \times 100$

where A0 isthe absorbance of the control and

A1is the absorbance of extract/standard

RESULTS AND DISCUSSION:

Table 1: Comparative studies on anti oxidant study

SL.NO	GROUP	CONCENTRATION	ABSORBANCE	PERCENTAGE SCAVENGING ACTIVITY
01	Ascorbic acid	20	0.098 mg/ml	64.27%
		40	0.076 mg/ml	72.29%
		60	0.052 mg/ml	81.04%
		80	0.031 mg/ml	88.69%
		100	0.021 mg/ml	92.34%
02	R.communis seed	20	0.1529 mg/ml	44.25%
		40	0.1321 mg/ml	51.84%
		60	0.1103 mg/ml	59.78%
		80	0.0926 mg/ml	66.24%
		100	0.0717 mg/ml	73.86%
03	R.communis stem	20	0.2521 mg/ml	8.09%
		40	0.2052 mg/ml	25.19%
		60	0.1752 mg/ml	36.12%
		80	0.1520 mg/ml	44.58%
		100	0.1390 mg/ml	49.31%
04	M.accuminata leaf	20	0.1811	33.97%
		40	0.1762 mg/ml	35.76%
		60	0.1521 mg/ml	44.54%
		80	0.1321 mg/ml	51.84%
		100	0.1173 mg/ml	57.24%
05	M.accuminata peel	20	0.1028mg/ml	62.52%
		40	0.0921 mg/ml	66.42%
		60	0.0762 mg/ml	72.22%
		80	0.0666 mg/ml	75.72%%
		100	0.0602 mg/ml	78.05%

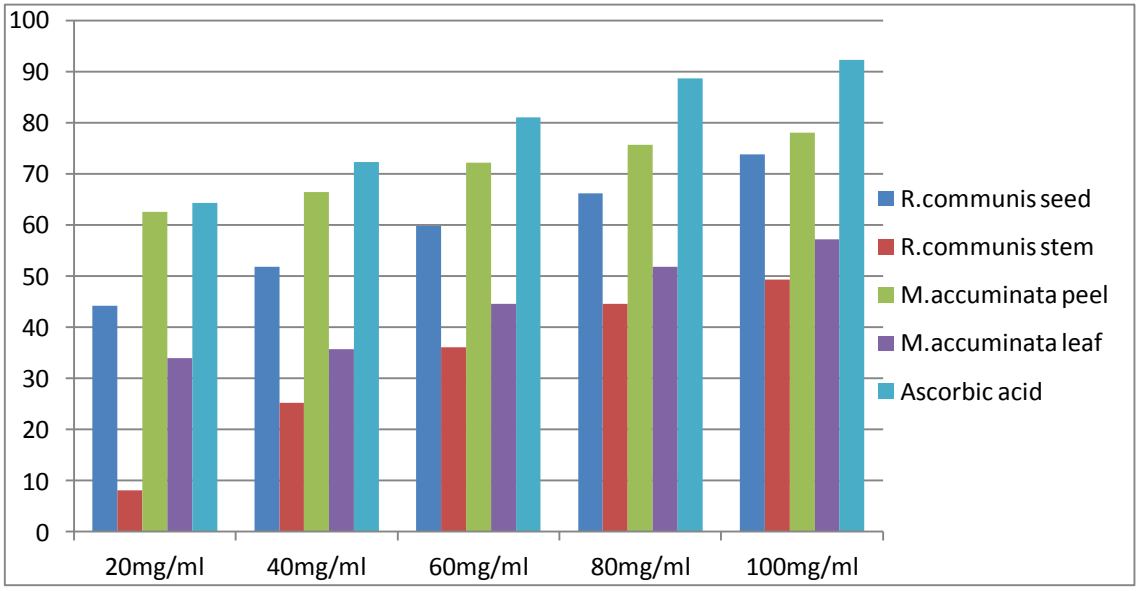

Fig 1: Comparative study on anti oxidant activity

CONCLUSION:

From the above data we observed that the Musa acuminata peel(100mg/ml) has shown greater activity with percentage scavenging capacity 78.05% ±0.5 when compared with the standard ascorbic acid

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