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Phytochemical Screening of Garhwal Himalaya Wild Edible Fruit Ficus palmata

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Abstract: *Ficus palmata* is a huge tropical deciduous evergreen tree with more than 800 species. Bark, root, leaves fruit and latex of this plant are frequently used for the treatment of various illnesses. *Ficus palmata* commonly known as Bedu and produces a unique quality in comparisons of all other fruits. *Ficus palmata* is a rich source of polyphenolic compounds, flavonoids, which are responsible for strong antioxidant properties that help in prevention and therapy of various oxidative stress related diseases such as neurodegenerative and hepatic diseases. The present research correlates evaluating the nutritional profile, successive value, thin layer chromatography and phytochemical screening of *Ficus palmata*.
Key Words: Nutritional value, Successive value, Thin Layer Chromatography and Phytochemical Screening.

INTRODUCTION:-

India has a rich heritage of traditional medicine constituting with its different components like Ayurveda, Siddha and Unani. Ayurveda and other Indian systems of medicines may be explored with the modern scientific approaches for better leads in the health care [1]. The use of herbs as medicine is the oldest form of healthcare known to humanity and has been used in all cultures throughout history [2]. There are great need of standardization and quality control of ayurvedic formulations, standardization and quality control depends upon the nature of crude drug and compound drugs, it's source i.e. factors associated with raw materials which are beyond of human control like seasonal, geographical, age of the plant, time of collection, type of drying etc, due to these natural conditions. The percentage of chemical constituents [3, 4] of the drug does no remain uniform as our expectation. The individual plant powders of the formulation were subjected to various pharmacognostical parameters. The Uttarakhand is highly enriched with its vegetation including wild edible fruits due to its varied eco-geographical and eco-climatic conditions [5]. *Ficus palmata* is herbaceous perennial plant belonging to the Moraceae family however the fruits are also used as a dry vegetable. *Ficus palmata* is a very tasty fruit. It is very much liked by all, the fig is a very juicy fruit and taken on standardizing the techniques for making various products such as squash, jam and jelly from this fruit [6]. *Ficus palmata* plant is used in various disease e.g. gastrointestinal, hypoglycemic, insulinase, anti-tumour, anti-ulcer, anti-diabetic, lipid lowering and antifungal activities. The present study aimed at evaluating Nutritional value, successive value, thin layer chromatography and phytochemical screening of *Ficus palmata.*

MATERIALS AND METHODS:-

PLANT MATERIAL: -
The fresh parts of fruit, bark and root of *Ficus palmata* was collected from adjoining area of Ghat village Dist- Chamoli, Uttarakhand in the month of September-November 2011. The plant was authenticated by botanist Dr. R. D. Guar, Department of Botany H. N. B. Garhwal (A Central University) Srinagar Garhwal, Uttarakhand India.

PREPARATION OF PLANT EXTRACT: - The plant material was separated into its selected parts (fruit, bark and root) air dried ground to moderately fine powder and soxhlet extracted with increasing polarity solvent (Petroleum ether, chloroform, ethyl acetate, acetone, methanolic, ethanolic and water) [7]. Each extract was evaporated to dryness under reduce pressure using rotary evaporator. The coarse powder of fruit, bark and root were subjected to successive hot continuous extraction with various solvent each time before extracting with next solvent the powdered material will be air dried (weight of crude extract 100gm). The various concentrated extracts were stored in air tight container for further studies.

NUTRITIONAL AND MINERAL ASSAY: - The edible portion of fruits was analyzed for moisture, ash fat [8], fiber as per method reported in AOAC. Total nitrogen was analyzed by microkjeldhal method [9], and for crude protein the value was multiplied by 6.25. Total carbohydrates were obtained by subtracting the value moisture, crude protein, crude fat, crude fiber and ash from 100% [10]. The total energy value equal to addition of fat, protein and sugars calorie, each gram of fat give 9 kcal, protein and sugar give 4 kcal energy. The minerals analyzed were Potassium using atomic absorption spectrophotometer, calcium and phosphorus by flame photometer. Ascorbic acid in fruits was estimated [11].

SUCCESSIVE VALUE: -
Accurately weighed 500gm coarse and air dried drug material were subjected to hot successive continuous extraction in soxhlet apparatus with different solvents with increase in polarity petroleum ether, benzene, chloroform, methanol, ethanol and finally with water. The extracts were filtered in each step concentrated and the solvent was removed by vacuum distillation. The extracts were dried in the vacuum dessicator and the residues were weighed [12]. Which contain maximum chemical compound are these categories as depend upon solvent nature and types.

DETECTION OF CHEMICAL COMPOUND THROUGH TLC:-
Thin layer chromatography (TLC) is a chromatography technique used to separate mixtures. Thin layer chromatography is performed on a sheet of glass, plastic, or aluminum foil, which is coated with a thin layer of adsorbent material usually silica gel, aluminium oxide, or cellulose. This layer of adsorbent is known as the stationary phase. After the sample has been applied on the plate, a solvent or solvent mixture (known as the mobile phase) is drawn up the plate via capillary action. Thin Layer Chromatographic plates are prepared by spreading silica gel G on glass plate using distill water as solvent these plates are activated in oven at $110^{O}C$ for half hour. All six extracts are applied separately and run in different solvent system of varying polarity. These plates are developed in Iodine chamber, UV chamber and spraying reagent for different spot of constituent chemical [13].

PHYTOCHEMICAL ANALYSIS:-
Preliminary phytochemical analysis extract was prepared by weighing and the dried powdered fruit, bark and root were subjected to hot successive continuous extraction with different solvents as per the polarity petroleum ether, benzene, chloroform, methanol, ethanol and finally with water. The extracts were filtered in each step concentrated and the solvent was removed by vacuum distillation. The extracts were dried over desiccators and the residues were weighed. The presence or absences of the primary and secondary phytoconstituents were detected by using standards methods [14].

Table 1 Nutritional value of *Ficus palmata* plant fruit.

Nutrients	Value	Nutrients	Value
Moisture (%)	48.20 ± 0.10	Insoluble ash (%)	9.46 ± 0.10
Ash (%)	4.06 ± 0.15	Soluble ash (%)	7.54 ± 0.10
Crude fat (%)	4.71 ± 0.20	Na (mg/100gm)	0.75± 0.12
Crude fibre (%)	17.65 ± 0.14	Ca (mg/100gm)	1.54 ± 0.13
Total nitrogen (%)	0.73 ± 0.05	Mg (mg/100gm)	0.92± 0.15
Total protein (%)	4.06 ± 0.08	K (mg/100gm)	1.58 ± 0.20
Carbohydrate (%)	20.78± 0.10	P (mg/100gm)	1.88 ± 0.02
Organic matter (%)	95.90± 0.15	Fe (mg/100gm)	0.018 ± 0.02

Table 2 Observations of thin layer chromatographic (TLC) studies of bark of *Ficus palmata*, W:C:M (Water: Chloroform: Methanol, 10:64:28-36).

Extract	Mobile phase	No. of spot	Rf. value	hRf. value
Pet. Ether Extract	(C:M:W) 64:30:10	1	(0.53)	(53)
Benzene Extract	(C:M:W) 64:30:10	1	(0.42)	(42)
Chloroform Extract	(C:M:W) 64:30:10	1	(0.44)	(44)
Methanolic Extract	(C:M:W) 64:28:10	6	(0.28,0.35,0.43, 0.52,0.71,0.80)	(28,35,43, 52,71,80)
	(C:M:W) 64:30:10	7	(0.28,0.35,0.43, 0.52,0.64,0.71,0.80)	(28,35,43, 52,64,71,80)
Ethanolic Extract	(C:M:W) 64:28:10	6	(0.28,0.35,0.43, 0.52,0.71,0.80)	(28,35,43, 52,71,80)
	(C:M:W) 64:30:10	7	(0.28,0.35,0.43, 0.52,0.64,0.71 0.80)	(28,35,43,52, 64,71,80)
Water Extract	(C:M:W) 64:30:10	2	(0.55,0.68)	(55,68)

Table 3 Extractive values of *Ficus palmata* plant bark.

Method of extraction	Values of three replicates (%w/w)	Mean (% w/w) ± SEM
Cold maceration:		
1) Water soluble	(20.05, 19.35 & 19.80)	19.73 ± 0.10
2) Alcohol soluble	(53.85, 53.63 & 52.86)	53.45 ± 0.25
Hot Extraction:		
1) Pet. Ether soluble	(0.80, 1.47 & 1.02)	1.09 ± 0.05
2) Benzene soluble	(3.40, 2.96 & 3.10)	3.15 ± 0.20
3) Chloroform soluble	(4.90, 5.25 & 5.06)	5.07 ± 0.34
4) Methanol soluble	(53.40,52.86 & 53.13)	53.13 ± 0.50
5) Ethanol soluble	(65.92, 66.57 & 67.13)	66.54 ± 0.85
6) Water soluble	(25.95, 26.29 & 26.54)	26.26 ± 0.92

Table 4 Phytochemical screening of *Ficus palmata* plant bark, (+) – Present, (-) – Absent.

Test	Pt. ether Extract	Benzene Extract	Chloroform Extract	Methanolic Extract	Ethanolic Extract	Water Extract
Carbohydrates/ glycosides						
(1) Molish test	(-)	(-)	(-)	(-)	(-)	(-)
(2) Fehling test	(-)	(-)	(-)	(-)	(-)	(-)
(3) Benedict test	(-)	(-)	(-)	(-)	(-)	(-)
Alkaloid						
(1) Mayer's test	(-)	(-)	(+)	(+)	(+)	(+)
(2) Dragondroff test	(-)	(-)	(-)	(+)	(+)	(-)
Flavonoids						
(1) Shinoda/pew	(-)	(-)	(-)	(+)	(+)	(+)
(2) Ammonia	(-)	(-)	(-)	(+)	(+)	(+)
Saponins	(-)	(-)	(-)	(+)	(+)	(+)
Tannins						
(1) Pyrogoll & catechol	(-)	(-)	(-)	(+)	(+)	(-)
(2) Gallic acid	(-)	(-)	(-)	(-)	(-)	(-)
Unsaturated sterol/triterpenes						
(1) Liebermann Burchard test	(+)	(+)	(+)	(+)	(+)	(-)
(2) Salkowiskis test	(+)	(+)	(+)	(+)	(+)	(-)
Resin	(-)	(-)	(-)	(+)	(+)	(-)
Phenolics compound						
(1) Ferric chloride	(-)	(-)	(-)	(+)	(+)	(-)
Protein and amino acid						
(1) Xanthoprotien	(-)	(-)	(-)	(-)	(-)	(-)

Figure 1.1 Comparison of per day intake of nutrients by adults with the nutrients present in the fruit of *Ficus palmata*.

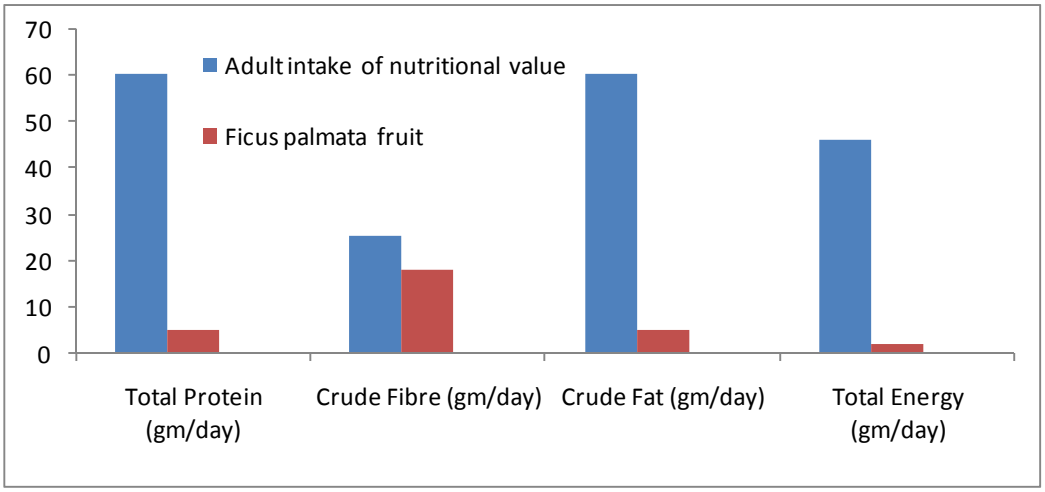

Table 5 Qualitative estimation of *Ficus palmata* fruit amino acid screening.

Amino acid test	***Ficus palmata* fruit**
L- Hydroxy proline	(-)
DL Serine	(+)
DL Iso-leucine	(+)
DL Valine	(+)
DL-2-Aminobutyric acid	(+)
L-Ornithin	(-)
L-Cystein hydroxyl	(+)
DL-Nor-leucine	(+)
DL-Tryptopham	(-)
DL-Alanine	(+)
L-Glutamic acid	(+)
Glycine	(-)
L –Proline	(-)
L- Arginine	(+)
DL – Aspartic acid	(+)
L –Cystein hydroxychloride	(+)
L- Histidine	(-)
L – Leucine	(+)
L –Lysine monochloride	(+)
DL – Methionine	(+)
DL – β-Phenyl alanine	(-)
DL – Threonine	(+)
L – Tyrosine	(+)
3-C-3-4Dihydroxy phenyl	(-)

Figure 1.2 Comparison of per day intake of minerals by adults with the mineral present in the fruit of *Ficus palmata*.

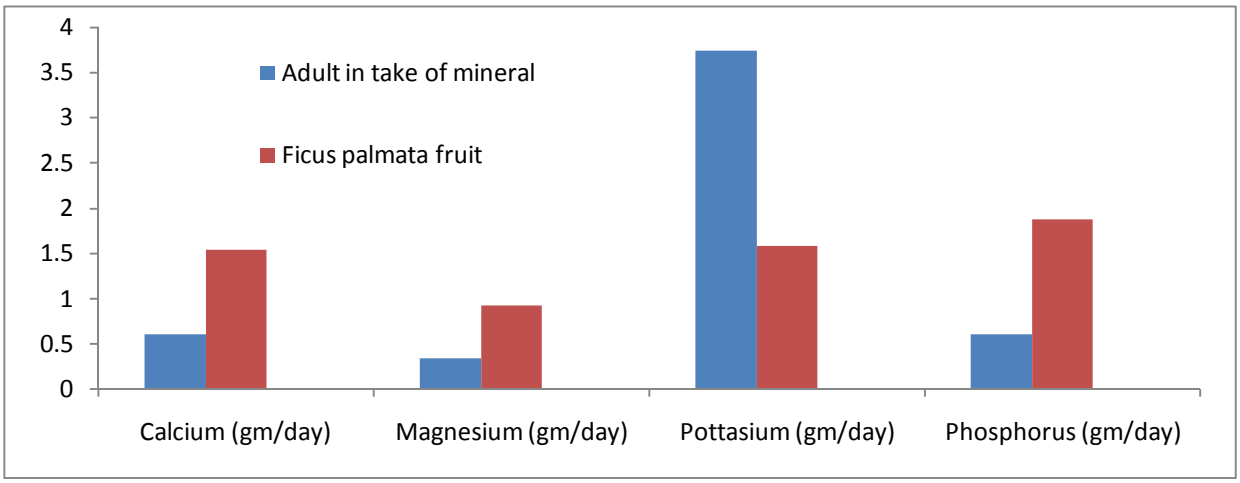

Figure 2.1 Thin layer chromatography qualitative analyses of six fractions against *Ficus palmata* plant bark extract.

RESULTS AND DISCUSSION:-

Plants are important source of potentially bioactive constituents for the development of new chemotherapeutic agents. The first step towards this goal is the nutritional profile, TLC analysis, successive extraction and phytochemical screening. The results of nutritional profile, TLC analysis, successive extraction and phytochemical screening as table 1, 2, 3 and 4, 5.

NUTRITIONAL VALUE: -

The level of nutrients such as crude protein, carbohydrates, crude fiber, and ash content (4.06%, 20.78%, 17.65% and 4.06%) and also minerals as calcium, magnesium, potassium and phosphorus (1.54, 0.92, 1.58 and 1.88 mg/gm) respectively.

SUCCESSIVE VALUE: - *Ficus palmata* barks contain significant value 66.54%, 53.13% and 26.26% against ethanolic, methanolic and water solvent with 500gm plant sample.

PHYTOCHEMICAL SCREENING:- The phytochemical screening of plant for the presence of glycosides, flavonoids, phenols, resin and tannins. This analysis revealed that the fruit contained higher value of fat, protein, fiber and minerals as compared to the cultivated fruits with mango and 500 gm fruits contain sufficient amount of nutrients required per day by a person.

CONCLUSIONS:-

The fruit, bark and root of *Ficus palmata* contain phytoconstituents like alkaloids, steroids, fats & fixed oil, flavonoids, tannins, proteins and carbohydrates. The TLC results of the ethanolic, methanol and water extract show that at least six different phytoconstituents were present in each extract of *Ficus palmata* bark. More detailed study must be done for farther isolation leading to the pure compounds.

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