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Phytochemical screening and nutritional evaluation of *Ficus tsjahela* Figs

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ABSTRACT

In this study, *Ficus tsjakela* figs were assessed for phytochemical and nutritional contents. The presented results displayed that the figs of *F. tsjakela* contains wide variety of phytoconstituents and appreciable level of nutritional attributes emphasizing high valued therapeutic potential which can be as a promising natural neutraceutical agent and can act as a substitute to the synthetic counterparts.

Keywords : *Ficus tsjahela*, proximate analysis, nutritional composition, phytochemical screening.

INTRODUCTION

Plant nutraceuticals chiefly allied with the content of several phytochemicals, predominantly nutritive factors, antioxidants and dietary fiber present in the plant products has been receiving recognition globally due to potential remedy against various chronic diseases and disorders (Pandey *et al.*, 2011; Nasri *et al.*, 2014; Madhurantakam *et al.*, 2018; Taroncher *et al.*,2021; Pemmaraju *et al.*,2022 Maurya *et al.*,2021).

Ficus tsjakela Burm.f., (Moraceae) deciduous tree native to Peninsular India bear figs where Frugivoure dependence is more. Many animals, Aves, mammals, Insecta, Reptilia depend on the figs of *Ficus tsjakela* for their diet (Sreekar, 2011). It was reported that Greater Golden-backed Woodpecker *Chrysocolaptes lucidus* feed on figs of *Ficus tsjakela* in its supplementary diet (Sreekar, 2011). This interesting aspect intended to take up the investigation on phytochemicals and dietary supplements of the figs of *Ficus tsjakela.*

Recently, Thamaraikani *et al.*, (2021) proved that fruits of *F.tsjahela* posses antioxidants and antimicrobial activity. The clinical signs resembled to neurotoxicity, Hematobiochemical, pathomorphological of Leaf of *F. tsjakela* was well studied on Livestock (Shridhar *et al.*,2014; Shridhar 2017 & 2020). Babu *et al.*, (2012) described the Ficus species in India. Sudhakar *et al.*, (2017) documented figs of eastern ghats and Reddy *et al.*, (2020) studied the diversity and distribution of Ficus species of Andhra pradesh.

The main purpose of this investigation is to evaluate the phytochemical constituents, proximate and mineral composition due to the paucity of information on *Ficus tsjakela* figs.

METHODOLOGY

Collection of Plant material and Authentication

After perusal of literature about the occurance of *F.tsjakela* (Reddy *et al.*, 2020),and citing *F.tsjakela* the figs were collected from 2nd Ghat Road of Tirumala, Buffer zone of Seshachalam Biosphere Reserve and Horsley Hills, Andhra Pradesh. (Fig 1. A,B) Authentification of *F.tsjakela* was done by Dr.K.Madhava chetty, Department of Botany, Sri Venkateswara University, Tirupati.

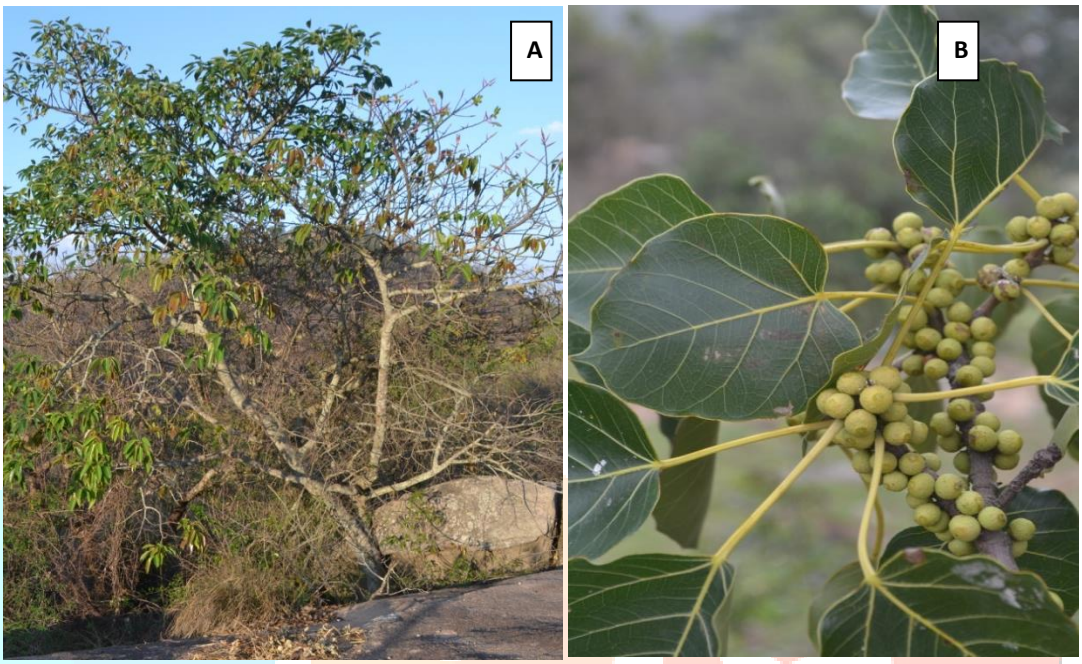

Fig : 1 *Ficus tsjakela* A. Habitat B. Figs

Phytochemical Screening

Preparation of the crude extract was followed according to standard procedures followed by Mohamed *et al*., (2020) and Madhusudhakar and Sudarsanam (2021). Detection of alkaloids by Dragendorff's test, flavonoids by alkaline reagent test and saponin from foam test. Ferric chloride test for tannins, Liberman-Burchard's test for steroids and sodium hydroxide test for coumarins, detection of glycosides by the Kellar-Kiliani test, phenolic compounds with Folin-Ciocalteau's test and quinines were identified by concentrated sulphuric acid test respectively Detection of Reducing sugars was performed using Benedict's test. (Table. 1) (Shaikh and Patil 2020; Mitta *et al*., 2014).

Nutritional composition

Determination of Nutrient composition, mineral content was evaluated using Standard food analysis methods adapted by Association of Official Analytical Chemists AOAC (2000) as recommended by Melsted *et al*.,(1969). Sodium (Na) and potassium (K) and metals such as calcium (Ca), magnesium (Mg), Iron (Fe), Lead (Pb), Nickel (Ni). Magnesium (Mg) and Zinc (Zn) were determined by Flame atomic absorption spectrometry (AAS) method in IIT SAIF Institute, Chennai. Nitrogen in fruit sample was analyzed through the Kjeldahl method. phosphorus (P) was determined by spectrophotometric colorimetric method using UV spectrophotometer according to AOAC procedure 965.17. Proximate analysis including Ash content, moisture content, crude lipid content, crude fibre content, crude protein, total carbohydrate content were determined by following the methods adapted by Hedge & Hofreiter, (1962) and Radha *et al*.,(2021). The energy content of each plant samples were determined by protocol developed by AOAC (2000) and values were calculated according to Datta *et al*., (2019).

To estimate protein content, pH, total sugars, reducing sugars, phenolic compounds, aqueous extracts were prepared. 5 g of the dry matter was incubated in bowling water for 15 to 20 min. The filtrate was retained and the infusion was repeated three times. The totality of filtrates was lyophilized.

Determination of percentage of Moisture, Ash, Crude Fat, Crude Fiber, Crude Protein, Crude Carbohydrate, Alkaloid, Flavonoid, Saponin was determined using standard methodology adapted by Harborne (1973) and followed the modified protocol of Radha *et al.*, (2021). The methods adopted from literature, while carbohydrate content was determined by difference (100−[% moisture + % protein + % fat + % ash + % fiber]). Total phenolics, flavonoids, flavonols and condensed tannins contents were determined by Mitta *et al.*,(2014) Extraction yields, proximate and mineral compositions were evaluated using standard protocol by Harborne (1998).

RESULTS AND DISCUSSION

The data of various qualitative studies about Phytochemical screening , Proximate analysis, nutritional compostion obtained are shown in Tables 1-4.

Phytochemical screening

Table 1: Preliminary phytochemical screening of the aqueous,methanolic and ethanolic crude extracts (+Trace, ++Moderate, +++High, −Absent) .

Secondary metabolites	*Aqueous*	*Methnolic*	*Ethanolic*	Test performed
Alkaloids	+	++	++	Dragendroff's reagent
Amino acids	++	+	+	Millon's test
Anthocyanidins	+	+	+	-
Anthroquinones	+	++	+	Modified Borntrager's test
Carbohydrates	+	+		Molish's test
Coumarins	+	++	++	NaOH paper test
Flavonoids	++	+	++	Shinoda's test
Glycosides	+	++	++	Keller-Killiani's test
Indoles	-	+	+	-
Leucoanthocyanins	-	++	++	-
Gums	++	-	-	Alcohol test
Phenols	+	+	++	$FeCl_3$ test
Proteins	++	+	+	Ninhydrin test
Phytosterol	-	-	-	Salkowski's test
Quinones	+	+	+	Alcoholic KOH test
Reducing sugars	++	++	++	Fehling's test
Saponins	+	-	-	Frothing test
Steroids	-	-	-	Salkowski's test
Starch	-	-	-	Iodine test
Fixed oils and Fats	+	-	-	Spot test/ Stain test
Tannins	+	+	+	Gelatine test
Terpenoids	+	+	++	Salkowski's test
Lipids	+	+	+	-
Lignins	+	+	++	Furfuraldehyde test
Lignans	+	+	++	-
Indoles	+	+	++	-

Preliminary phytochemical screening of the aqueous and ethanolic crude extracts of *F.tsjakela* figs revealed the presence and absence of varied phytoconstituents. The phytochemical constituents investigated were alkaloids, saponins, glycosides, steroids, anthraquinones, coumarins, phenols, tannins, flavonoids, anthocyanins, phlobatannins, carbohydrates, starch, proteins, and lignin were summarized in Table (1). A sequential extraction using Aqueous, methanol and ethanol were screened for the presence of secondary metabolites. Phytochemical screening methods adapted were crosschecked with Shaikh and Patil (2020).

Nutritional composition

Table :2 : Proximate analysis of *Ficus tsjakela* figs

Attribute	*Ficus tsjakela*
Moisture content (%)	14.15±0.42
Dietary fiber (%)	3.6±0.58
Ash (%)	5.33±0.74
Crude fat (%)	2.05±0.72
Crude protein (%)	3.60±0.42
Lipids (%)	2.76±0.68
pH	5.8 ± 1.2
Total Sugars (g DW/L)	14.33 ±1.34
Reducing sugars (g DW/L)	2.17±0.87
Total carbohydrate (%)	54.2±0.45
Calorific value (kcal/100 g sample)	192±2.48

Proximate analysis is an important index to classify the nutritional value of a food material (Sousa et al., 2014). Results depicted in Table 2 display Proximate compositions of powdered figs of *F.tsjakela*. Results revealed that the dominant components are carbohydrate (54.2%). However, the amount of Ash (5.3%) and Moisture content (13%) was quite undesirable. lipid, fibre, fat, protein contents were lower.

Table 3: Mineral elements of figs of *F.tsjakela*

Mineral composition (mg/100 g dry weight)	*Ficus tsjakela*
Na	19.40 ± 0.48
P	112.70± 0.12
K	8.23 ± 1.26
Ca	94.92 ± 0.74
Mg	3.03 ± 0.26
Fe	49.72 ± 0.56
Zn	4.04 ± 1.02
Mn	5.08 ± 0.82

Five macro-elements (Ca, Na, K, P, and Mg) and two micro-elements (Fe and Zn) were evaluated which are considered to be important for human nutrition (Senthilkumar *et al.*, 2020). The mineral content (mg/100g) found in *Ficus tsjahela* viz., were shown in Table 3. The macro minerals analyzed included sodium (Na), potassium (K) and calcium (Ca). The

micro minerals included magnesium (Mg), zinc (Zn), iron (Fe) and manganese (Mn). The mineral content is expressed as mg/g dry plant material.

Table 4 : Antioxidants composition Nutritional values of aqueous extract of *Ficus tsjakela* figs. DW: dry weight of plant. Cal: calorie. The values are the mean of three determinations ± standard error.

Antioxidant compounds /Attribute	Extract		
	Ethanol	Methanol	Aqueous
Total Phenolic content (TPC) (µg GAE/gm dry weight)	226.86±2.52	205.38±1.57	96.22±3.85
Total Flavonols (TF) (µgCatechin /gm dry weight)	213.52±1.88	232.16±1.84	189.28±2.64
Total Proanthocyanidines (TP) (µg CE/gm dry weight) TP	276.08±2.62	250.28±2.12	295.25±2.56
Total Flavonoid content (TFC) (µg QCE/gm dry weight)	256.08±1.66	230.59±1.19	265.73±1.98

With respect to the total phenolic content, the Ethanolic extract has higher content of this constituent than that of methanol and aqueous extracts (Ethanol > Methanol > Aqueous). Total Flavonols (TF) stand to be higher in Methanolic extract. Total Proanthocyanidines (TP) and Total Flavonoid content (TFC) seems to be high in Aqueous extract. Total Phenolic content (TPC) expressed in (µg GAE/gm dry weight) ; Total Flavonols (TF) in (µg Catechin /gm dry weight). Total Proanthocyanidines (TP) in (µg CE/gm dry weight) TP and Total Flavonoid content (TFC) in (µg QCE/gm dry weight).

The Extractive yield (%) of edible plants in different solvent extract. of *Ficus tsjakela* Aqueous extract (5.258 ± 0.080), ethanolic extract (3.980 ± 0.160) and Methanolic extract (2.982 ± 0.133). Based on the result reported here, the highest extractive yield obtained with Aqueous solvent indicating the phytoconstituents in this material are water soluble which correlates with the studies conducted by Datta *et al.,* (2019) & Uma *et al.,* (2010).

Phytochemical screening, Proximate analysis, Nutritional composition assays determine the neutraceutical and therapeutical biomolecules which have a wide range of potential applications in the manufacture of new drugs, nutraceuticals, and healthcare products used to treat different types of diseases (Rawat *et al*.,(2014) , Sousa *et al*.,(2014), Bakari *et al*., (2017), Salami and Afolayan (2021).

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In summary this study revealed different proximate and mineral composition values included in the human recommended daily allowance and their extracts showed high content of total phenol and flavonoids content which are antioxidants and neutraceutical agents. There results on the Qualitative Profiling of Phytochemicals, nutrient composition, elemental analysis indicate that their consumption may provide the recommended nutritional requirements needed for a healthy diet which are present in the figs of *Ficus tsjakela.*

CONCLUSION

Based on the above findings, it can be ascertained that figs of *Ficus tsjakela* can be considered as a source of natural nutritional attributes with dietary and neutraceutical potential.

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REFERENCE

AOAC (2000) Official methods of analysis. seventeenth edn. Association of Official Analytical Chemists. Washington DC, Arlington, Virginia, USA.

Babu C L, Sudhakar JV, Kumar A, Bajapai O, Tiwari R, and Murthy GVS, (2012). Synopsis of the Genus *Ficus* L. (Moraceae) in India. Taiwania, 57 (2): 193-216.

Bakari, Daoud A., Felhi S., Smaoui S., Gharsallah N., Kadri A (2017) Proximate analysis, mineral composition, phytochemical contents, antioxidant and antimicrobial activities and GC-MS investigation of various solvent extracts of *cactus* cladode. *Food Science and Technology* (Campinas) [online]. 37(2): 286-293.

Datta, S., Sinha, B. K., Bhattacharjee, S., & Seal, T. (2019). Nutritional composition, mineral content, antioxidant activity and quantitative estimation of water soluble vitamins and phenolics by RP-HPLC in some lesser used wild edible plants. *Heliyon*, *5*(3), e01431. https://doi.org/10.1016/j.heliyon.2019.e01431

Harborne, JB (1973). Phytochemical methods. London: Chapman and Hall, Ltd: pp. pp.188.

Hedge, J.E., Hofreiter, B.T. (1962). Determination of reducing sugars and carbohydrates. *In:* Whistler R.L., Be Miller J.N., editors. Methods in Carbohydrate Chemistry. Academic Press; New York: pp.380–394.

Madhurantakam, C., Pallavi, P., Halmuthur M., Kumar S., (2018). Nutraceuticals in Prophylaxis and Therapy of Neurodegenerative Diseases, Editor(s): Brahmachari G, Chapter 8 - *In* Natural Product Drug Discovery, Discovery and Development of Neuroprotective Agents from Natural Products, 359-376, https://doi.org/10.1016/B978-0-12-809593-5.00008-2.

Madhusudhakar, D and Sudarsanam, G (2021). Phytochemical and Antioxidant activity evaluation of Fruit Exract of *Memecylon lushingtoni*. Annals of Plant Sciences. 10(6):4222-4226.

Maurya A.P., Chauhan J., Yadav D. K., Gangwar, R., Maurya V. K., (2021). Nutraceuticals and their impact on human health. Editor(s): Egbuna C, Mishra A.P,. Goyal M.R, Preparation of Phytopharmaceuticals for the Management of Disorders, Academic Press, Chapter 11 - Pages 229-254, https://doi.org/10.1016/B978-0-12-820284-5.00011-3.

Melsted, S. W.; Motto, H. L.; Peck, T. R. (1969). Critical Plant Nutrient Composition Values Useful in Interpreting Plant Analysis Data. Agronomy Journal, *61(1), 17–.20*

Mitta, MN., Rao, M. S, Ramesh L and Chetty K. M.(2014). Phyto- Chemical Evaluation and Anti-oxidant potentiality of *Cycas beddomei* Dyer Male cone aqueous Extract. International Journal of Drug Development and Research. 6 (2): 220-227.

Mohamed, E.A.A., Muddathir, A.M. & Osman, M.A. (2020). Antimicrobial activity, phytochemical screening of crude extracts, and essential oils constituents of two *Pulicaria* spp. growing in Sudan. Scientific Reports 10:17148 https://doi.org/10.1038/s41598-020-74262-y

Nasri, H., Baradaran, A., Shirzad, H., & Rafieian-Kopaei, M. (2014). New concepts in nutraceuticals as alternative for pharmaceuticals. *International journal of preventive medicine*, *5*(12), 1487–1499.

Pandey N., Meena R.P., Rai, S.K & Rai, S.P. (2011). Medicinal plants derived nutraceuticals: A Re-emerging health aid. *International Journal of Pharma and Bio Sciences.* 2. 420-441.

Pemmaraju D.B., A Ghosh., Gangasani J.K., Murthy U.S.N., Naidu V.G.M., Rengan A.K., (2022). Herbal biomolecules as nutraceuticals, Chapter 21 - Editor(s): Mandal S C., Nayak A.K, Dhara A.K., Herbal Biomolecules in Healthcare Applications, Academic Press, 525-549, https://doi.org/10.1016/B978-0-323-85852-6.00025-1.

Radha K.M.; Puri, S.; Pundir, A.; Bangar, S.P.; Changan, S.; Choudhary, P.; Parameswari, E.; Alhariri, A.; Samota, M.K.; *et al.* (2021). Evaluation of Nutritional, Phytochemical, and Mineral Composition of Selected Medicinal Plants for Therapeutic Uses from Cold Desert of Western Himalaya. Plants, 10, 1429. https://doi.org/10.3390/plants10071429

Rawat S, Andola H, Giri L, Dhyani P, Jugran A, Bhatt I.D. & Rawal R. S. (2014) Assessment of Nutritional and Antioxidant Potential of Selected Vitality Strengthening Himalayan Medicinal Plants, *International Journal of Food Properties*, 17(3) :703-712, DOI: 10.1080/10942912.2012.654563

Reddy, N. C. M., Anjaneyulu, P., Nagesh, S. M., Sudhakar, J. V., Rao B. R. P., (2020). Diversity and Distribution of Wild Figs (*Ficus* L.) of Andhra Pradesh, India. *Bioscience Discovery*, **11**(4):223-235.

Salami, S.O., Afolayan, A.J. (2021). Evaluation of nutritional and elemental compositions of green and red cultivars of roselle: *Hibiscus sabdariffa* L. *Scientific reports.* **11:**1030 DOI: https://doi.org/10.1038/s41598-020-80433-8

Senthilkumar, R., Muragod, P.P., & Muruli, N. V. (2020). Nutrient Analysis of Sweet Potato and Its Health Benefits, Indian Journal of Pure & Applied Biosciences. 8(3): 614-618. DOI: http://dx.doi.org/10.18782/2582-2845.7933

Shaikh J.R., Patil, M.K., (2020). Qualitative tests for preliminary phytochemical screening: An overview. International Journal of Chemical Studies 8(2):603-608. DOI: 10.22271/chemi.2020.v8.i2i.8834

Shridhar, N.B. (2017). Therapeutic management of toxicity of *Ficus tsjahela* leaves in cattle. Toxicology International; 24(3):313-318

Shridhar, N.B., Krishna N.S., Santhosh Kumar C.N., (2014). Toxicity of *Ficus Tsjahela* leaves in cattle and its clinical management. The Indian Veterinary Journa.l 91(7):49-50.

Sousa, E. C., Uchôa-Thomaz, A. M. A., Carioca, J. O. B., Morais, S. M. D., Lima, A. D., Martins, C. G., Alexandrino, C. D., Ferreira, P. A. T., Rodrigues, A. L. M., Rodrigues, S. P., Silva, J. D. N., & Rodrigues, L. L. (2014). Chemical composition and bioactive compounds of grape pomace (*Vitis vinifera* L.), Benitaka variety, grown in the semiarid region of Northeast Brazil. *Food Science and Technology*, 34(1): 135-142

Sreekar, R., (2011). Figs in the diet of Greater Golden-backed Woodpecker *Chrysocolaptes lucidus*. Indian BIRDS 7 (5): 147.

Sudhakar J.V, Reddy N. C. M & Murthy G.V.S, (2017). *Figs of Eastern Ghats*. Pragathi Offset Pvt. Ltd., Hyderabad

Taroncher M., Vila-Donat P., Tolosa J., Ruiz M.J ., Rodríguez-Carrasco Y (2021). Biological activity and toxicity of plant nutraceuticals: an overview. *Current Opinion in Food Science*. 42: 113-118.

Thamaraikani, V., Divya, A.S & Sekar T (2021). Analysis of the phytochemicals, antioxidants, and antimicrobial activity of *Ficus tsjahela* burm.f leaf, bark, and fruit extracts. *Asian Journal of Pharmaceutical and Clinical Research.* 54-59. 10.22159/ajpcr.2021.v14i2.40185.

Uma D.B., Ho C.W., Wan W.M., Aida W.M. (2010). Optimization of extraction parameters of total phenolic compounds from Henna (*Lawsonia inermis*) leaves. Sains Malays. 39(1):119–128.