



BOOK OF PROCEEDINGS

(Available at: <http://acsnigeria.org/publications/proceedings>)

Evaluation of the Biological Activity of *Fiscus natalensis* Leaves

Bilkisu A. Adedoyin, Jemimah S. Wakawa, Adole V. Ogijo, and Abdulrahman G. Abdulmumini  
Applied Chemistry Research Laboratory, Department of Chemistry, University of Abuja, Nigeria

Corresponding Author's email: [bilkisu.adedoyin@uniabuja.edu.ng](mailto:bilkisu.adedoyin@uniabuja.edu.ng)

ABSTRACT

*Fiscus natalensis* from Moraceae family, native to Africa with edible vegetables and fruits used in traditional medicine for the treatment of illness, due its antimicrobial, anti-inflammatory, and antioxidants activities. The study aims at determining proximate analysis, phytochemical constituents, total phenolic content and antioxidant activity of the Dichloromethane and Methanol crude extracts of *F. natalensis* leaves. The phytochemical screening revealed the presence of 12 secondary metabolites in both extracts. Percentage proximate analysis showed the plant contain, Moisture content (14.44%), Dry matter content (13.12%), Ash content (9.35%), Crude Protein (5.75%), Carbohydrate (21.36%), Fat/Lipid (11.73%), and Fiber content (11.72). The total Phenolic contents were recorded as  $3.82 \pm 0.15$  mg/g and  $2.05 \pm 0.13$  mg/g for DCM and Methanol crude extracts respectively. Antioxidant activity shows 74.3%, and 59.6 %, at concentration of 1.5mg/ml for DCM and Methanol extracts, against DPPH free radicals which compared well with the standard antioxidants (Butylated Hydroxyl Anisole 78.4%, Ascorbic acid 68.1%, and  $\alpha$ -Tocopherol 63.3%). The high antioxidant activity observed in the crude extracts of this plant may be attributed to the phenolic component obtain in the results.

**KEYWORDS:** Anti-oxidant, *Fiscus natalensis*, Phenolic content, Phytochemical, Proximate.

1. INTRODUCTION

*Fiscus nantalensis* are edible fruits and vegetables used in traditional medicine to treat a variety of illnesses.<sup>2</sup> Alkaloids, flavonoids, tannins, saponins, and phenolic compounds are among the many bioactive secondary metabolites found in the family. Nigerian traditional healers are aware of the plant's therapeutic benefits and utilize it as herbal remedy<sup>3</sup>. The whole plant has been utilized for traditional medicine because of its antimicrobial, anti-inflammatory, and antioxidant properties. Carbohydrates, alkaloids, terpenoids, cardiac-glycosides, saponins, phenolic, flavonoids, anthraquinones, tannins, coumarins, resins, are secondary metabolites from plants that poses medicinal value which have biological activity against infections.<sup>4</sup> Natural antioxidants such as polyphenols and carotenoids are found in medicinal plant and food which shows a range of biological effects on degenerative diseases including anti-inflammatory, anti-cancer and anti-aging.<sup>14</sup> Studies show that plant-based antioxidants can prevent and treat degenerative diseases that are induced by oxidative stress, including diabetes, cancer, inflammation, cardiovascular disease, and dementia.<sup>15</sup> The research aims at investigating the proximate analysis, phytochemical composition, total phenolic content and antioxidant activities of the crude extracts of *F. natalensis* leaves.

2. MATERIALS AND METHODS

2.1. Plant collection and identification

The leaves of *Fiscus natalensis* were collected from Bomo village and Samaru Zaria. Identified and authenticated by Mr. Yahaya Umar Galla at Ahmadu Bello University, Zaria herbarium. The voucher number AB1845 and identification number NB237450 was deposited in the Herbarium ABU, Zaria. The collected sample was washed, air dry, and pulverized in to powder using a wood milling machine.

2.2. Proximate Analysis

The proximate composition (Carbohydrate, Moisture content, Crude Protein, and Ash content) of powdery sample of *F. natalensis* was determined according to standard procedures outlined by the Association of Official Analytical Chemist (AOAC, 2019).<sup>3</sup>



## BOOK OF PROCEEDINGS

(Available at: <http://acsnigeria.org/publications/proceedings>)

### 2.3. Extraction Crude Extracts

A portion (200g) of the pulverized plant was successively extracted using Soxhlet apparatus with 500ml (each) of Dichloromethane (DCM) and Methanol (MeOH) as solvents. The e fractions were collected and concentrated with the aid of a rotary evaporator at 40°C, weighed and kept at ambient temperature.

### 2.4. Phytochemical Screening of Crude Extract and Determination of Total Phenol Content

The fractions obtained were tested for the presence of secondary metabolites.<sup>3</sup> A critical tool for detecting the different biochemical substances produced by plants is qualitative phytochemical screening.<sup>6</sup>and was done using the specified standard procedures.<sup>7</sup>Total phenolic content of *F. natalensis* leave fractions was determined by Folin-Ciocalteu reagent<sup>4</sup>. The antioxidant activity of *F. natalensis* leaves fractions were determine using the DPPH free radical scavenging activity method.<sup>8</sup>

## 3. RESULTS

### 3.1 Proximate analysis

The results Proximate analysis of *Fiscus natalensis*, leaves presented in table 1, shows various nutritional and pharmacological parameter measures observed from the plant material.

Table 1: Result of Proximate Analysis of *Fiscus Proximate*.

Parameters	Percentage %
Moisture Content	17.44
Dry Matter Content	13.12
Ash Content	10.64
Crude Protein	5.75
Carbohydrate content	27.36
Fat/Lipid Content	3.97
Fiber Content	21.72

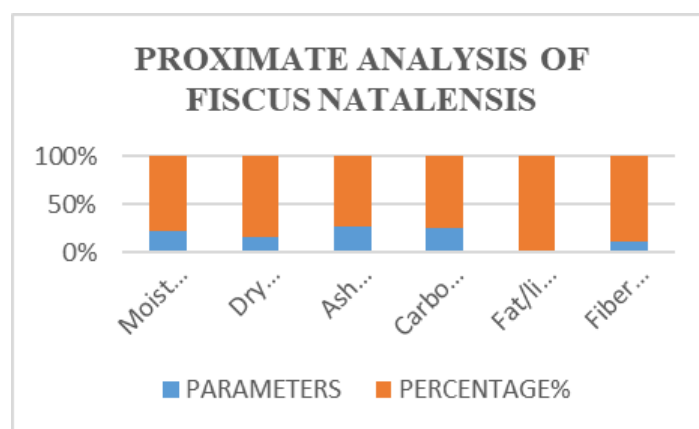


Figure 1: Percentage proximate constituent of *F. natalensis* leaves.

### 3.2. Phytochemical screening

Table 2 present the results of phytochemical screening of *F. natalensis*, the results show the presence nine secondary metabolites in both fractions, except for terpenoids, and cardiac glycosides which were found present in DCM fraction only.



## BOOK OF PROCEEDINGS

(Available at: <http://acsnigeria.org/publications/proceedings>)**Table 2:** Result of Phytochemical screening of *Fiscus natalensis* crude extracts.

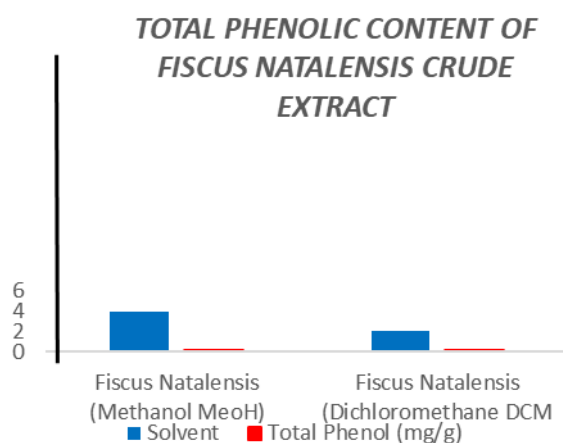
Secondary Metabolite	DCM Fraction	Methanol Fraction
Carbohydrate /reducing sugar	+	+
Alkaloids Meyer's test	-	-
Alkaloids Drangendroff's test	-	+
Terpenoid	+	-
Triterpenes	-	-
Cardiac Glycosides	+	-
Saponins	+	+
Phenolic Compounds Tannins	+	+
Flavonoids	+	+
Steroids	+	+
Quinones	-	-
Anthraquinones	+	+
Tannins	+	+
Coumarins	+	+
Amino acid	-	-
Resins	+	+

**Note:** "+" indicates the presence of metabolite, and "-" indicates its absence of metabolite.**3.3. Total Phenolic Content**

The total phenolic content of the Methanol and DCM fractions of *F. natalensis* (Table 3) were 3.82 and 2.05 mg/g.

**Table 3:** Total Phenolic Content of *Fiscus Natalensis* Crude Extract

PLANT	SOLVENT	TOTAL PHENOL (mg/g)
<i>Fiscus Natalensis</i>	Methanol	3.82 ± 0.15
<i>Fiscus Natalensis</i>	DCM	2.05 ± 0.13

**Figure 2:** Total Phenolic Content of *Fiscus Natalensis* Fractions

BOOK OF PROCEEDINGS

(Available at: <http://acsigeria.org/publications/proceedings>)

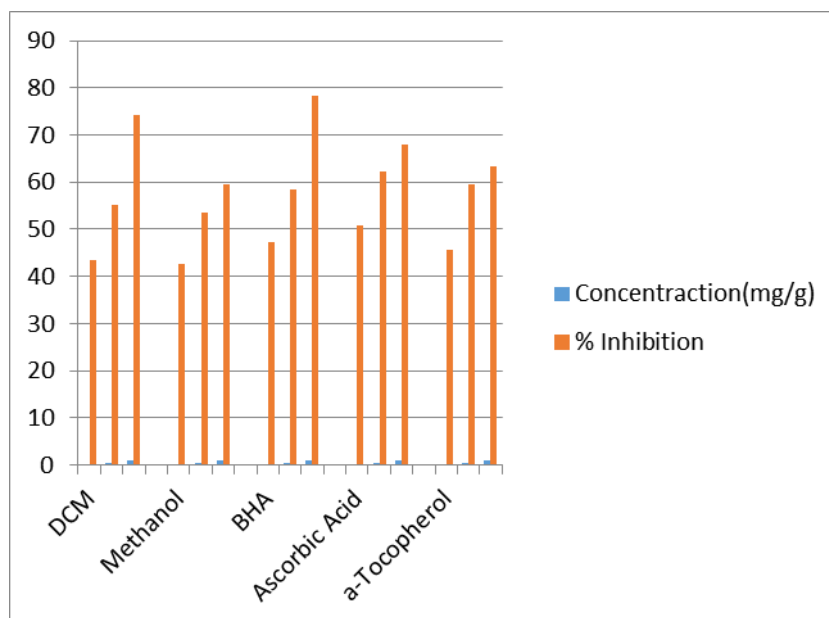
3.4. Antioxidant Activities of *Fiscus natalensis* Fractions

Table 4 present the antioxidant activity of the DCM and Methanol fractions of *Fiscus natalensis*, the antioxidant activity compares well the standard antioxidants of Butylated Hydroxyl Anisole (BHA), ascorbic acid and  $\alpha$ -tocopherol. The results show high activity inhibition of 74.3% against the DPPH free radicals at concentration of 1.5mg/ml.

**Table 4:** Absorbance and Percentage inhibition of the Fractions and Drugs Against DPPH Free Radical at 517nm Absorbance.

Plant Extracts/ Drugs	Solvent of Extraction	Concentration (mg/ml)	Absorbance	% Inhibition
Crude Extract	DCM	0.25	0.3387 $\pm$ 0.030	43.5
		0.5	0.3840 $\pm$ 0.022	55.2
		1.0	0.4344 $\pm$ 0.033	74.3
Crude Extract	Methanol	0.25	0.3387 $\pm$ 0.030	42.7
		0.5	0.3840 $\pm$ 0.022	53.4
		1.0	0.4344 $\pm$ 0.033	59.6
Ascorbic acid		0.25	0.0843 $\pm$ 0.010	50.7
		0.5	0.2883 $\pm$ 0.032	62.3
		1.0	0.3107 $\pm$ 0.142	68.1
BHA		0.25	0.0374 $\pm$ 0.023	47.2
		0.5	0.0461 $\pm$ 0.081	58.5
		1.0	0.0481 $\pm$ 0.022	78.4
$\alpha$ - Tocopherol		0.25	0.6801 $\pm$ 0.027	45.7
		0.5	0.7040 $\pm$ 0.021	59.4
		1.0	0.7046 $\pm$ 0.001	63.3

Key: BHA Butylated Hydroxyl Anisole



**Figure 3:** Absorbance and Percentage inhibition of Fractions and Drugs Against DPPH Free Radicals.



## BOOK OF PROCEEDINGS

(Available at: <http://acsnigeria.org/publications/proceedings>)

#### 4. DISCUSSION

Proximate analysis of *Ficus natalensis* leaves indicates that the plant contained Moisture content 17.44%, dry matter 13.12%, Ash content 10.64%, Crude Protein 5.75%, Carbohydrate 27.36%, fat/lipid content 3.97%, fibre content 21.72% respectively. A similar study presents 10.59%, 10.83%, for ash and protein content respectively.<sup>4,13</sup>The fibre content of 21.72% could be of great value in both human and animal nutrition. Fibers have the potential to reduce glucose absorption as well as insulin secretion.<sup>9</sup> The carbohydrates content of 27.36% makes it rich in nutrients and can serve as potential nutritious food supplement.<sup>4,13</sup>The phytochemical screening of *F. natalensis* shows the presence of carbohydrates, alkaloids, saponins, phenolic, flavonoids, anthraquinones, tannins, coumarins, and resins as secondary metabolites in both fractions. However, terpenoids, and cardiac glycosides were found present in DCM fraction only while triterpenes, quinone and amino acid were absent in both fractions. Research has shown that tannins have the potential as an anti-inflammatory, and a means of removing harmful free radicals and reactive oxygen species.<sup>10</sup> Saponins are essential in diet which improve blood glucose response and antioxidant properties.<sup>11</sup> The phytochemicals present in *F. natalensis* leaves shows evidence of high medicinal properties therefore, it is highly recommended. The total phenolic content of the Methanol and DCM fractions of *F. natalensis* were  $3.82 \pm 0.15$  mg/g and  $2.05 \pm 0.13$  respectively. This indicates the quantities of phenolic compounds present in the fractions were connected with the antioxidant and anti-inflammatory properties of this medicinal plant<sup>12</sup>.The antioxidant activity of the DCM crude extracts shows high activity inhibition of 74.3% against the DPPH free radicals at concentration of 1.5mg/ml. This result compares well with Butylated Hydroxyl Anisole (BHA) drug valuing 78.4% and water extracts of *F. natalensis* leaves valuing  $74.673 \pm 0.302$  reported by (Peiris, *et al* 2023). The Methanol fraction have percentage inhibition of 59.6%. This shows activity inhibition but not as active as DCM fraction and is below the standard drugs (Ascorbic acid 68.1%, BHA 78.4%) but similar to that  $\alpha$ - Tocopherol with 63.3%.

#### 5. CONCLUSION

This research provides valuable insights in the phytochemical constituent, proximate analysis, total phenolic content and antioxidant activity of *F. natalensis* leaves. The proximate analysis provides an overview of its nutritional and pharmacological potential with high fibre and carbohydrates contents. Therefore, it can be a of a good source for foods and pharmaceuticals agents. The phytochemicals findings from this study proof its potent therapeutic qualities; therefore, the medicinal relevance is highly recommended. The research finding suggest further investigation on potential health benefits and bioactive compounds, development of functional foods and pharmaceuticals and large quantitative and qualitative study to determine correlation between antioxidant activity and total phenolic content of *F. natalensis*.

#### REFERENCES

- (1) Asad, U.; Sidra, M.; Syed, L. B.; Noreen, K.; Lubna, G.; Benjamin, G.; Abdul-Hamid, E.; Mariusz, J. Important Flavonoids and Their Role as a Therapeutic Agent. *National Library Medicine*. **2020**. 25-22:5243.
- (2) Judith, F.; Gervais, M.; Happi, d.; Gabin, T.; Maurice, D.; Awouafack, B. N. Chemical constituents from *Ficus natalensis* hochst (Moraceae) and their chemo phenetic significance. *Research Gate*. **2021**. 95 104227.
- (3) Priyanka, S.; Mithilesh, S.; Gautami, D.; Rakhi, C. Herbal Medicine and Biotechnology for the Benefit of Human Health. *Science Direct*. **2014**. 563-575
- (4) Muhammad, A. Phytochemical Screening, antimicrobial and Antioxidant Activities of *Fiscus Natalensis*. *ResearchGate*. **2016**. 345-351.
- (5) Zhenkai, T.; Wenfeng, H.; Xiao, F. Aiwei, G. Biological Function of Plant Tannin and Its Application in Animal Health. *Frontiers in Veterinary Science*. **2022**. 8.
- (6) Elvino, N.; Moses, B.; Doice, M.; Pardon, N. Extraction Methods, Quantitative and Qualitative Phytochemical Screening of Medicinal Plants for Antimicrobial Textiles: A Review. *National Library Medicine*. **2022**. 11-15.



BOOK OF PROCEEDINGS

(Available at: <http://acsnigeria.org/publications/proceedings>)

- (7) Kartik, S.; Ramandeep, K.; Satish, S.; Ramesh, K. S.; Saponins A Concise Review on Food Related Aspects, Applications and Health Implications. *Science Direct*. **2023**. 2.
- (8) Ewegbe, O. T.; Osowe C. O.; Olajide, O. O.; Adu, O. A.; Chineke C. A. Proximate and Phytochemical Analysis of *Fiscus* Species Composite Leaf Powder. *Conference, Nig. Soc.***2024**. 49.
- (9) Shaimaa, E.A. E.; Mostafa, H. B.; Abeer, T. Phytochemical Profile and Antioxidant Capacity of *Ficus natalensis* Subsp. *leprieurii* (miq) Cultivated in Egypt: In-vitro Study. *Research Article*.**2023**.
- (10) Zhenkai, T.; Wenfeng, H.; Xiao, F. Aiwei, G. Biological Function of Plant Tannin and Its Application in Animal Health. *Frontiers in Veterinary Science*. **2022**. 8.
- (11) Wenli, S.; Mohamad, H.S. Therapeutic Potential of Phenolic Compounds in Medicinal Plants—Natural Health Products for Human Health. *Molecules*. **2023**. 28-4, 1845
- (12) Peiris, D.S.H.S.; Fernando, D.T.K.; Nimesha, S.; Chathuranaga, R. Phytochemical Screening for Medicinal Plants: Guide for Extraction Methods. *Asian Plant Research Journal*. **2023**. 11.
- (13) Muhammad, A.; Muniza, A.; Khalid, Khan.; Shahnaz, P.; Shazia, Shah. Phytochemical Screening, Antimicrobial and Antioxidant Activities of *Fiscus Chaturanga*. **2020**. 38, 02.
- (14) Dong-Ping Xu., Ya Li., Xiao Meng., Tong Zhou., Yue Zhou., Jie Zheng., Jiao-Jiao Zhang., and Hua-Bin Li1. Natural Antioxidants in Foods and Medicinal Plants: Extraction, Assessment and Resources. *International Journal of Molecular Sciences*. **2017**. 18(1): 96.
- (15) Syed Anees Ali Jafri., Zafar Mehmood Khalid., Mohammad Rizwan Khan., Sadia Ashraf., Nausea Ahmad., Abdunasser Mahmoud, Karami., Ejaz Rafique., Mohamed Ouladsmane., Nouf Mohammad Saad Al Suliman., and Summan Aslam. Evaluation of some essential traditional medicinal plants for their potential free scavenging and antioxidant properties. *Journal of King Saud University – Science*. **2023**. 35(3)