

Dose-Dependent Effect Of *Bryophyllum pinnatum* Crude Extract On Lipid Profile, Hepatic And Renal Biomarkers In Wistar RatsVictoria N. Mokwenye^{1*} and Esther F. Adeogun²¹Department of Chemical Pathology, Faculty of Medical Laboratory Science, Wellspring University, Benin City, Nigeria.²Department of Biochemistry, Faculty of Life Sciences, University of Benin, Nigeria.**ABSTRACT**

Bryophyllum pinnatum (*B.pinnatum*), is a medicinal plant extensively used in Nigerian traditional medicine and other parts of the world for the management of various ailments. In many homes, the succulent leaves are squeezed without extraction solvents and juice administered orally. Biochemical safety of this traditional mode of administration remains poorly documented. This study investigated the phytochemical composition of this leaf juice and evaluated its short-term effects on serum lipid profile, hepatic and renal function biomarkers in Wistar rats. Fresh *B. pinnatum* leaves were homogenized without extraction solvents and standard methods used to quantify flavonoids, cardiac glycosides, coumarins, phlobatannins, tannins and steroids. Using twenty Wistar rats (five per group); Control received 1mL distilled water and other groups respectively, one teaspoon of juice (702.5 mg/kg) body weight, two teaspoons (1405 mg/kg) and three teaspoons (2107.5 mg/kg) daily for eight consecutive days. Serum lipid profile, liver function indices and kidney function biomarkers were determined using standard methods. Quantitative phytochemical analysis revealed the presence of coumarins, flavonoids, cardiac glycosides, steroids, tannins and phlobatannins. Results at all tested doses produced no statistically significant ($p > 0.05$) difference in total cholesterol, HDL, LDL, TG, AST, ALT, ALP, bilirubin, protein, urea, uric acid or creatinine compared with the control group. These findings indicate no adverse effect on hepatic/renal function or lipid metabolism following short-term exposure supporting a biochemical safety of this ethnomedicinal practice at these tested doses. Long-term toxicity studies, histopathological evaluations and mechanistic investigations are warranted to establish the chronic safety profile and therapeutic potential.

Key words: *Bryophyllum pinnatum*, phytochemicals, lipid profile, Hepatic function, kidney function, Dosage.

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Introduction

In ancient times, the primitive man observed the great diversity of plants available. Herbs have been used by all cultures for the treatment and management of various ailments.¹ Preference for natural products has increased as a result of changing lifestyles or developing consumer knowledge of the possible dangers related to chemicals.²

Bryophyllum pinnatum (fig.1) is identified by its thick, fleshy leaves and distinctive serrated edges and belongs to the Crassulaceae family, which is widely recognized for its medicinal uses across Africa, Asia, and South America. The plant can grow up to 150 cm in height. Due to its attractive and unique appearance, it is a popular houseplant that is commonly planted as an interior decoration.² The plant is commonly called “miracle leaf”, “air plant”, “life plant”, “master herb”, “cure-all”, and “best of luck leaves” reflecting its esteemed status in folk medicine.³ The cultural integration of the plant is reflected in its different local names in Nigeria which are “Odaa opue” (in Igbo), “Ewe abamoda” or “Odundun” (in Yoruba), “mgbitingbi” (in Delta Ibo), “karam masarachi” (in Hausa) as some of the names given to it in Nigeria.

Often called “Never-die leaf” in “Pidgin English”, it is known for its ability to grow new plants from its leaf margins, symbolizing life and resilience.⁴

B. pinnatum is known to contain various bioactive secondary metabolites, including flavonoids, cardiac glycosides, and alkaloids, which are reported to be responsible for its anti-inflammatory, analgesic, and antimicrobial properties.⁵ *B. pinnatum* leaves are applied to wounds, bruises, swellings, insect bites and used against urinary bladder stones, cough, dysentery.⁵ The leaf juice is externally applied to scabies and leukoderma and a leaf decoction is applied over cuts to stop bleeding.⁶ In Brazil, *B. pinnatum* leaf is used for burns, calluses, conjunctivitis, coughs, dermatitis, dermatosis, earaches, eczema, edema, erysipelas, fever, glaucoma, headache, infections, inflammation, insect stings, intestinal problems, itch, kidney stones, lymphatic disorders, mouth sores, nervousness, respiratory infections,

rheumatism, scurvy, skin problems, toothache, tuberculosis, tumor, ulcers, urinary insufficiency, wart, whooping cough, wounds, and as a sedative.^{3,6,7}

Due to the numerous claims reported in literature on the use of *Bryophyllum pinnatum*, there is paucity of information on the phytochemicals and the biochemical safety of the succulent manually squeezed leaves without extraction solvents in relation to the traditional mode of preparation and administration, hence this research.

Materials and Methods**Reagent**

*Corresponding author. mail:

victoria.mokwenye@wellspringuniversity.edu.ng

Tel: +2348035853827

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Analytical-grade reagents and chemicals were used. All assays employed ready-to-use kits from Randox (United Kingdom) for Cholesterol, High density lipoprotein (HDL), Triglycerides, Aspartate transaminase (AST), Alkaline phosphatase (ALP), Alanine transaminase (ALT), Bilirubin, Total protein, Albumin, Globulin, Urea, Uric acid and Creatinine.

Plant material

The plant materials were collected at a garden in Ugbowo, Benin city, 6.34°N, 5.62°E, Nigeria in March, 2026 and identified by Prof. Akinnibosun Henry Adewale (FLS, MRSB; London) in the department of Plant Biology and Biotechnology, Faculty of Life Sciences, University of Benin where a voucher number UBH-B593 was allocated.



Fig. 1: *Bryophyllum pinnatum*

Preparation of crude extract

Fresh *Bryophyllum pinnatum* leaves were washed thoroughly with distilled water to remove dirt and other adhering materials. The leaves were subsequently broken into smaller pieces and homogenized using a domestic electric blender to obtain a uniform homogenate, then filtered to obtain the aqueous crude extract (being a succulent leaf). The extract was prepared freshly daily without additives or solvents and used for this experiment.

Ethical Approval

This was obtained from the Research and Ethics Committee of Wellspring University, Edo State, Nigeria with Reference Number WSU/26/005.

Animals

An eight-day (8 days) acute toxicity studies were conducted using twenty Wistar rats of five each in four groups. They were bought in Anatomy department in the University of Benin and housed in the animal house, in standard laboratory cages, where they acclimatized for two weeks before the start of the experiment and were fed ad-libitum with chow and clean water. Group one was the control and was given 1mL of distilled water, groups two, three and four were given one teaspoon (702.5 mg/kg body weight), two teaspoons (1405 mg/kg body weight) and three teaspoons (2107.5 mg/kg body weight) daily respectively of crude extract for 8 days consecutively using a gastric gavage. They were observed daily for behavioral or physical changes. At the end of the experiment, the animals were humanely sacrificed and the blood collected in plain bottles and serum separated to cover 15 different biochemical assays. The humane sacrifice was done via anesthetic overdose in accordance with guidelines from the National Institutes of Health, World Health Organization.

Group I: Controls (1mL of distilled water)
Group II: Low dose extract (702.5 mg/kg body weight)
Group III: Medium dose extract (1405 mg/kg body weight)
Group IV: High dose extract (2107.5 mg/kg body weight)

Phytochemical Analysis

Determination of Coumarins⁸

A 0.5ml of 5N NaOH was added to the solution of 1 ml of the extract (0.5g in 1 ml methanol). The mixture was heated at 80°C for 5mins. After cooling, 0.75ml of 5N H₂SO₄ was added and mixed thoroughly, then, 0.25g of anhydrous NaHCO₃ was also added and transferred to the extractor and made up to 50 ml with pet-ether, for 3hrs. About 20ml of H₂O was added to the pet-ether extract and carefully evaporated in water bath at 50-55°C. The aqueous solution was transferred to a volumetric flask and made up to 50ml with mixing. 25ml of aqueous solution was pipetted into a flask and 1%. Na₂CO₃ solution was added and heated in a water bath at 75°C for 15mins and cooled. 5 ml of the diazonium solution was added, stood for 2 hours and the absorbance at against a reagent blank taken at 540nm. Esculin was used as standard.

Total Flavonoids Content⁹

Total flavonoid content was determined by Aluminum chloride method using Quercetin as a standard. 1ml of test sample and 4ml of water were added to a volumetric flask (10ml vol.). After 5mins, 0.3ml of 5% Sodium nitrite and 0.3ml of 10% Aluminum chloride were added. After 6mins incubation at room temperature, 2ml of 1M Sodium hydroxide was added to the reaction mixture. Immediately, the final volume was made up to 10ml with distilled H₂O. The absorbance of the reaction mixture was read spectrophotometrically at 510nm against a blank.

Cardiac Glycosides¹⁰

A 10% extract was mixed with 10ml of freshly prepared Baljet's reagent (95ml of 1% picric acid plus 5ml of 10%NaOH). After an hour, the mixture was diluted with 20ml distilled water and the absorbance was measured at 495nm. Securidaside was used as standard.

Steroids⁹

Determination was done using 1ml of extract of the steroid solution transferred into a 10 ml volumetric flask. 4NSulphuric acid (2ml) and Iron (III) chloride (0.5% w/v 2 ml) were added, followed by potassium hexacyanoferrate (III) solution (0.5% w/v, 0.5 ml). The mixture was heated with occasional shaking and diluted to the mark with diluted water. The absorbance was measured at 780 nm against the reagent blank. Stigmasterol was used as standard.

Tannins¹¹

Tannins was determined by Folin-Ciocalteu method. 0.1 ml of sample extract was added to volumetric flask (10ml) containing 7.7 ml of distilled water. The mixture was shaken well and kept at room temperature for 30mins. A set of reference standard solutions of Tannic acid (20, 40, 60, 80, and 100 ug/ml) was treated in the same manner as described for sample extract. Absorbance for test and standard solutions were measured against reagent blank at 700nm with the unknown extrapolated against Tannic acid obtained graph.

Phlobatannins¹²

Phlobatannins (condensed tannins/proanthocyanidins) was quantified using the Porter acid-butanol assay. The sample is heated in an acidic medium (butanol-HCl) in the presence of ferric ammonium sulfate. This process cleaves the interflavanoid bonds, transforming condensed phlobatannins into red anthocyanidins. The light absorbance was read at 550 nm and quantified using a tannic acid standard curve.

Biochemical Assays on the serum

Analytical-grade reagents and chemicals were used. All assays employed ready-to-use kits from Randox (United Kingdom) for Cholesterol, HDL, LDL (calculated), Triglycerides, AST, ALP, ALT, Bilirubin, Total protein, Albumin, Globulin (calculated), Urea, Uric acid and Creatinine. Manufacturer's instructions were strictly adhered to. The concentrations of Low-Density Lipoprotein (LDL)-cholesterol was calculated by modification of Friedewald's formula¹³

Estimation of serum Bilirubin¹⁴

The colorimetric method, following Jendrassik and Grof¹⁴ was employed for bilirubin estimation. Direct bilirubin reacted with diazotized sulphanilic acid in an alkaline medium to create a blue-coloured complex. Total bilirubin was determined in the presence of caffeine, which liberated albumin-bound bilirubin, through the reaction with diazotized sulphanilic acid.

Estimation of serum Total Protein¹⁵

The Biuret method, as outlined by Tietz¹⁵ was employed. Cupric ions react with protein peptide bonds in an alkaline environment, leading to the development of a colored complex.

Estimation of serum Albumin¹⁶

For serum albumin measurement, the colorimetric method described by Doumas *et al*¹⁶ was employed. Serum albumin quantitatively binds to the indicator 3,3',5,5'-tetrabromo-m cresol sulphonephthalein (bromocresol green, BCG). The albumin-BCG complex exhibits maximum absorption at 578 nm, with the absorbance directly proportional to the albumin concentration in the sample.

Estimation of serum Globulin¹⁷

This is done by subtracting albumin level from the total protein level¹⁷.

Kidney Function Test

Estimation of serum Urea, Uric Acid and Creatinine were done using Randox (United Kingdom) Kits and keeping to manufacturer's instructions.

Statistical Analysis

Data obtained were expressed as mean $\pm$ standard error of mean (SEM). Values were subjected to one-way analysis of variance (ANOVA) and differences between samples were analysed by Tukey's multiple comparison using GraphPad Prism 10 Statistical package. P values < 0.05 were regarded as significant.

Results and Discussion

The phytochemical results are shown in fig.2 and table 1. The plant's juice contains Coumarin (0.1606 ± 0.0004 mg EE/mL extract); Flavonoids (0.3439 ± 0.0010 mg QE/mL extract); Cardiac glycosides (0.2162 ± 0.0294 mg SE/mL extract); Steroids (0.0844 ± 0.0002 mg STE/mL extract); Tannins (0.0960 ± 0.0005 mg TAE/mL extract) and Phlobatannins (0.0980 ± 0.0003 mg TAE/mL extract).

Lipid profile

Fig.3 and Table 2 shows the lipid profile results of the rats. There were no statistically significant differences ($p > 0.05$) observed in the levels of Total Cholesterol (TC), HDL, LDL and Triglycerides (fig.3 and table 2) between the control group and the group administered with *Bryophyllum pinnatum* crude juice at different doses for eight days. This suggests that at various tested doses and duration, the extract did not exert any measurable influence on the overall lipid metabolism in the animals used. This may imply that the extract does not have hypolipidemic or hyperlipidemic properties.

Liver function

There was no statistically significant difference ($p > 0.05$) in AST, ALT, ALP (fig.4 and table 3), total bilirubin, conjugated bilirubin (fig.5 and table 4), albumin, globulins or total protein (fig. 6 and table 5) concentrations when compared to the control groups.

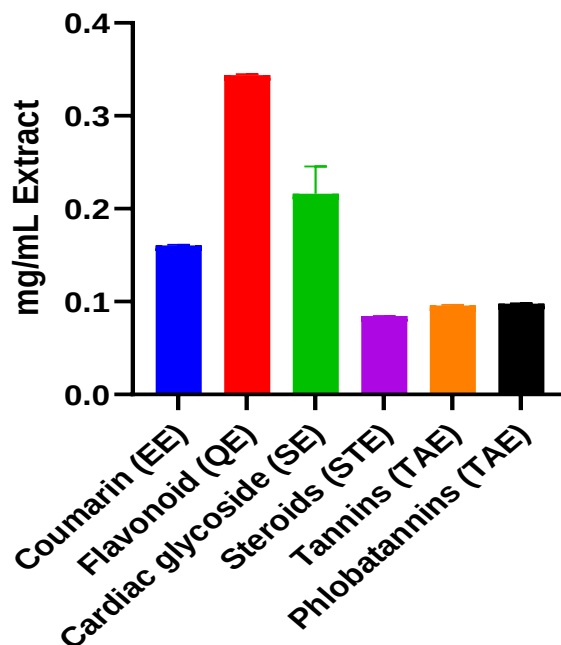


Fig. 2: Quantitative phytochemical constituent of *Bryophyllum pinnatum* crude leaf

Values are expressed as mean $\pm$ standard error of mean (n=3). EE: Esculin Equivalents; QE: Quercetin Equivalents; SE: Securidaside Equivalents; STE: Stigmasterol Equivalents; TAE: Tannic Acid Equivalents.

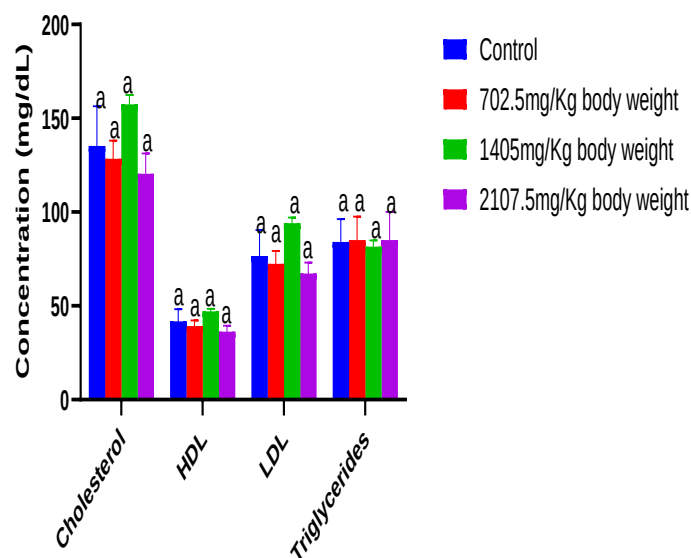


Fig. 3: The effect of *Bryophyllum pinnatum* crude extract on the concentrations of Cholesterol, High density lipoprotein (HDL), Low density lipoprotein (LDL) and triglycerides

Values are expressed as mean $\pm$ SEM, n=5. No significant difference at $p < 0.05$ compared to the control.

Table 1: Quantitative Phytochemical Constituents of *Bryophyllum pinnatum* leaf juice

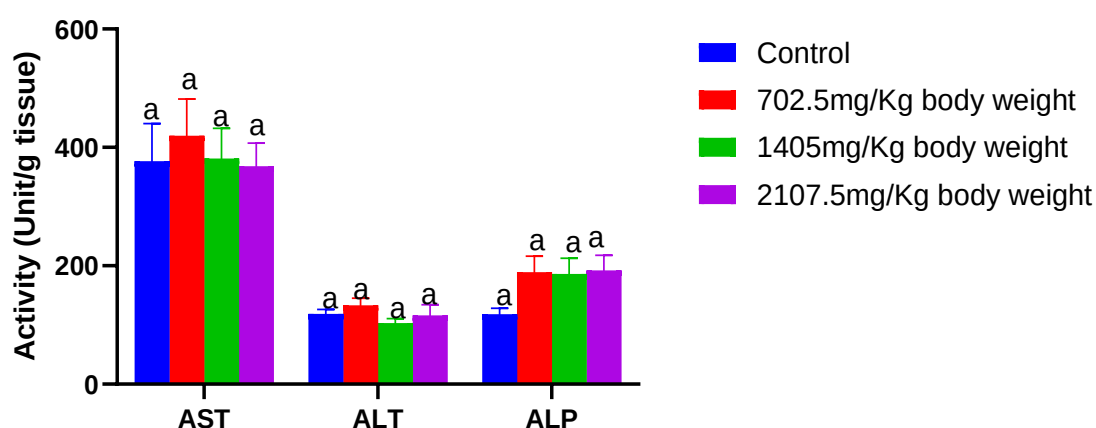
Phytochemical	Unit of Measurement	Mean Concentration ($\pm$ SEM)
Coumarin	mg EE/mL extract	0.1606 $\pm$ 0.0004
Flavonoid	mg QE/mL extract	0.3439 $\pm$ 0.0010
Cardiac glycoside	mg SE/mL extract	0.2162 $\pm$ 0.0294
Steroids	mg STE/mL extract	0.0844 $\pm$ 0.0002
Tannins	mg TAE/mL extract	0.0960 $\pm$ 0.0005
Phlobatannins	mg TAE/mL extract	0.0980 $\pm$ 0.0003

Values are expressed as mean $\pm$ standard error of mean (n=3). EE: Esculin Equivalents; QE: Quercetin Equivalents; SE: Securidaside Equivalents; STE: Stigmasterol Equivalents; TAE: Tannic Acid Equivalents.

Table 2: The effect of *Bryophyllum pinnatum* crude extract on the concentrations of Cholesterol, High density lipoprotein, Low density lipoprotein and triglycerides (mg/dL)

Dose (mg/Kg body weight)	Mean	SEM	P values	Significant difference
Cholesterol concentration (mg/dL)				
Control (1 mL distilled water)	135.2	21.21	-	-
702.5	128.4	9.70	0.9671	No
1405	157.4	5.05	0.5071	No
2107.5	120.4	10.91	0.7667	No
High density lipoprotein (HDL) concentration (mg/dL)				
Control (1 mL distilled water)	41.80	6.39	-	-
702.5	39.20	3.01	0.9650	No
1405	47.00	1.38	0.7862	No
2107.5	36.20	3.15	0.7471	No
Low density lipoprotein (LDL) concentration (mg/dL)				
Control (1 mL distilled water)	76.60	13.82	-	-
702.5	72.40	6.84	0.9842	No
1405	94.00	3.05	0.4777	No
2107.5	67.20	5.81	0.8563	No
Triglycerides concentration (mg/dL)				
Control (1 mL distilled water)	84.00	12.29	-	-
702.5	85.00	12.65	>0.9999	No
1405	81.00	3.30	0.9989	No
2107.5	85.00	15.08	>0.9999	No

Values are expressed as mean $\pm$ SEM, n=5. No significant difference at $p < 0.05$ compared to the control.

**Fig. 4:** The effect of *Bryophyllum pinnatum* crude extract on aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) activities (U/L)

Values are expressed as mean $\pm$ SEM, n=5. No significant difference at $p < 0.05$ compared to the control.

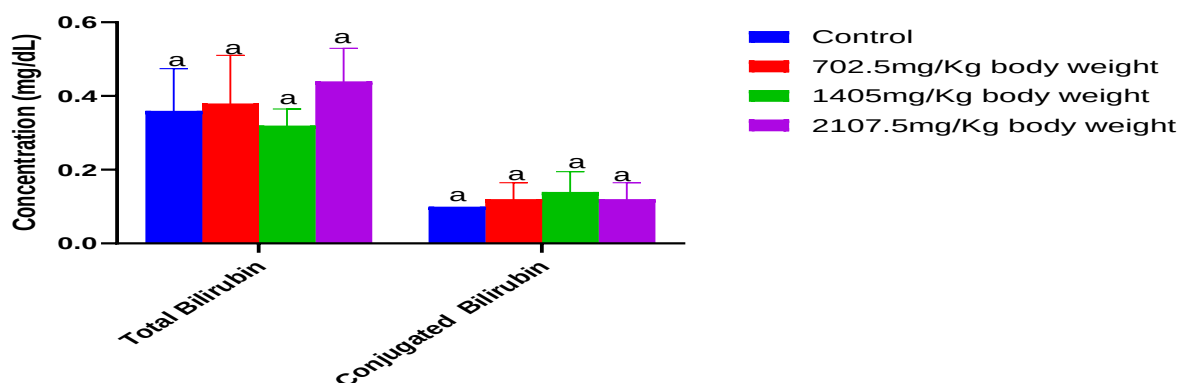


Fig. 5: The effect of *Bryophyllum pinnatum* crude extract on Total bilirubin and Conjugated bilirubin (mg/dL). Values are expressed as mean $\pm$ SEM, n=5. No significant difference at $p < 0.05$ compared to the control.

Table 3: The effect of *Bryophyllum pinnatum* crude extract on aspartate aminotransferase (AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) activities (U/L)

Dose (mg/Kg body weight)	Mean	SEM	P values	Significant difference
Aspartate aminotransferase (AST) activity (U/L)				
Control (1 mL distilled water)	376.60	63.60	-	-
702.5	419.60	61.98	0.9436	No
1405	381.20	50.80	>0.9999	No
2107.5	368.40	38.81	0.9996	No
Alanine aminotransferase (ALT) activity (Unit/g tissue)				
Control (1 mL distilled water)	118.80	7.70	-	-
702.5	133.20	11.99	0.8409	No
1405	103.00	7.90	0.8011	No
2107.5	116.00	18.46	0.9985	No
Alkaline phosphatase (ALP) activity (Unit/g tissue)				
Control (1 mL distilled water)	118.00	10.43	-	-
702.5	189.00	27.13	0.1845	No
1405	186.20	26.75	0.2115	No
2107.5	192.20	25.57	0.1572	No

Values are expressed as mean $\pm$ SEM, n=5. No significant difference at $p < 0.05$ compared to the control.

Table 4: The effect of *Bryophyllum pinnatum* crude extract on Total bilirubin and Conjugated bilirubin (mg/dL)

Dose (mg/Kg body weight)	Mean	SEM	P values	Significant difference
Total bilirubin (mg/dL)				
Control (1 mL distilled water)	0.36	0.05	-	-
702.5	0.38	0.06	0.9886	No
1405	0.32	0.02	0.9200	No
2107.5	0.44	0.04	0.5969	No
Conjugated bilirubin (mg/dL)				
Control (1 mL distilled water)	0.10	0.00	-	-
702.5	0.12	0.02	0.8728	No
1405	0.14	0.02	0.4537	No
2107.5	0.12	0.02	0.8728	No

Values are expressed as mean $\pm$ SEM, n=5. No significant difference at $p < 0.05$ compared to the control.

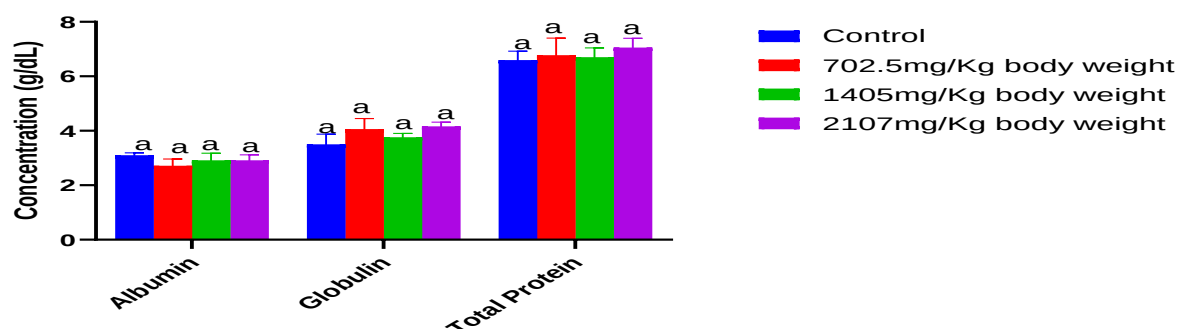


Fig. 6: The effect of *Bryophyllum pinnatum* crude extract on the concentrations of Albumin, Globulin and Total protein (g/dL). Values are expressed as mean $\pm$ SEM, n=5. No significant difference at $p < 0.05$ compared to the control.

Kidney Function

The results indicate that regardless of the dosage administered, *Bryophyllum pinnatum* leaves extract had no statistically significant ($p > 0.05$) impact on urea, uric acid and creatinine (fig. 7 and table 5). The present study has demonstrated that freshly squeezed *B. pinnatum* leaf juice contains appreciable quantities of flavonoids, cardiac glycosides, coumarins, tannins, phlobatannins and steroids. Previous

reports indicated that flavonoids represent one of the major classes of bioactive compounds in *B. pinnatum* and are largely responsible for many of its antioxidant and anti-inflammatory properties.^{18,19} The mode of extraction has been demonstrated to affect the composition and anti-oxidant activities of the leaf extracts,^{20,21,22} with some complementary activity in the treatment of infections caused by some Gram-negative bacteria.²³

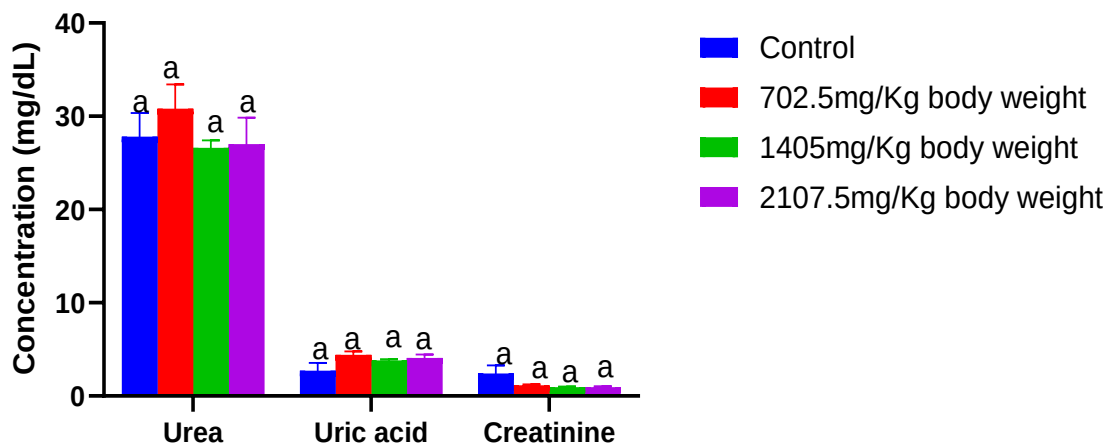


Fig. 7: The effect of *Bryophyllum pinnatum* crude extract on the concentrations of Urea, Uric acid and Creatinine (mg/dL). Values are expressed as mean $\pm$ SEM, $n=5$. No significant difference at $p < 0.05$ compared to the control.

Table 5: The effect of *Bryophyllum pinnatum* crude extract on the concentrations of Albumin, Globulin and Total protein (g/dL)

Dose (mg/Kg body weight)	Mean	SEM	P values	Significant difference
Albumin concentration (g/dL)				
Control (1 mL distilled water)	3.100	0.09	-	-
702.5	2.72	0.24	0.5789	No
1405	2.92	0.26	0.9263	No
2107.5	2.92	0.20	0.9263	No
Globulin concentration (g/dL)				
Control (1 mL distilled water)	3.50	0.38	-	-
702.5	4.06	0.39	0.5414	No
1405	3.76	0.14	0.9206	No
2107.5	4.16	0.16	0.4056	No
Total protein concentration (g/dL)				
Control (1 mL distilled water)	6.60	0.32	-	-
702.5	6.78	0.62	0.9902	No
1405	6.70	0.34	0.9983	No
2107.5	7.06	0.34	0.8680	No

Values are expressed as mean $\pm$ SEM, $n=5$. No significant difference at $p < 0.05$ compared to the control.

Table 6: The effect of *Bryophyllum pinnatum* crude extract on the concentrations of Urea, Uric acid and Creatinine (mg/dL)

Dose (mg/Kg body weight)	Mean	SEM	P values	Significant difference
Urea concentration (mg/dL)				
Control (1 mL distilled water)	27.80	2.54	-	-
702.5	30.80	2.62	0.8031	No
1405	26.60	0.81	0.9832	No
2107.5	27.00	2.85	0.9949	No
Uric acid concentration (mg/dL)				
Control (1 mL distilled water)	2.72	0.83	-	-
702.5	4.42	0.37	0.1115	No
1405	3.82	0.12	0.4214	No
2107.5	4.10	0.36	0.2393	No
Uric acid and Creatinine concentration (mg/dL)				
Control (1 mL distilled water)	2.40	0.89	-	-
702.5	1.16	0.09	0.2514	No
1405	0.96	0.05	0.1516	No
2107.5	0.96	0.07	0.1516	No

Values are expressed as mean $\pm$ SEM, $n=5$. No significant difference at $p < 0.05$ compared to the control.

The non-toxic effect of *Bryophyllum pinnatum* crude leave extracts at different doses for eight days (8days) suggests that at various tested doses and duration, the extract did not exert any measurable influence on the overall lipid metabolism in the animals used. This may imply that the extract does not have hypolipidemic or hyperlipidemic properties. Also, this may be due to the duration of the experiment and dosage.²⁴ Cholesterol is essential for the synthesis of steroid hormones, bile acids and vitamin D. Cholesterol is also important in maintaining the structure and fluidity of membranes.²⁵ HDL acts as a scavenger of cholesterol by removing cholesterol from the arterial wall and preventing its accumulation. LDL plays a role in delivery of cholesterol from the liver to the tissues that need it,²⁶ while triglycerides are the vital energy reserves, providing fuel during fasting or increased physical activity.²⁶

The consistent lack of change across these multiple parameters (AST, ALT, ALP, total bilirubin, conjugated bilirubin, albumin, globulin and total protein) may indicate that *Bryophyllum pinnatum* leaves crude extract at the administered doses and for eight days did not induce significant hepatocellular damage or compromise the liver's synthetic or excretory functions. This indicates the safety of *Bryophyllum pinnatum* leaves crude extract for the short-term administration of eight days only. AST and ALT are intracellular enzymes released into the blood when liver cells are damaged, serving as a sensitive indicator of hepatocellular injury while ALP is found in various tissues including the liver and is elevated when there is impairment in bile flow or liver lining.²⁷ Bilirubin is a by-product of red blood cell breakdown, processed by the liver and excreted in bile. Elevated bilirubin suggests a problem with its hepatic processing.²⁸ Total proteins, albumin and globulin are proteins synthesized primarily by the liver. These proteins are important for maintaining osmotic pressure, immune function and the transportation of molecules. Altered protein levels could indicate impaired liver synthetic capacity or systemic changes related to toxicity.^{29,30,31}

Urea, uric acid and creatinine are commonly accepted biomarkers for assessing renal health and potential damage.^{32,33} Alterations in their serum concentration may provide evidence of changes in renal function and potential renal impairment.³⁴ Urea, a waste product of protein metabolism excreted by the kidneys remained within the normal physiological ranges across all the groups. Also, uric acid (a nitrogenous waste product) and creatinine (product of muscle metabolism), filtered by the kidneys showed no significant changes attributable to *Bryophyllum pinnatum* leaf extract. These findings suggest that *Bryophyllum pinnatum* leaves extract, at the particular dose and days administered, does not exert nephrotoxic effects. The absence of significant changes in the levels of urea, uric acid and creatinine indicates that *Bryophyllum pinnatum* leaves extract did not impair the filtration, reabsorption or secretion functions of the kidney during the experiment [34]. This is an important observation for any substance intended for potential therapeutic or other applications, as preserving kidney function is crucial for overall wellbeing.

Conclusion

Bryophyllum pinnatum leaves crude extract is non-toxic when administered by the oral route over a period of eight days at the above doses. This research offers a valuable insight into the safety of *Bryophyllum pinnatum* for short durations. The absence of toxic effects on lipid profile, kidney and liver after an eight-day administration underscores its potential as a safe and beneficial remedy. As scientific exploration continues, *Bryophyllum pinnatum* may emerge as very significant plant in phytomedicine. Limitations: This study did not involve histological analysis of vital organs and might be requested for future evident conclusions.

Conflict of Interests

The authors declare no conflict of interest.

Authors' Declaration

The authors hereby declare that the work presented in this article are original and that any liability for claims relating to the content of this article will be borne by them.

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