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Research article

Phytochemical and Biological Assessment of Polarity-Guided Extracts of *Amorphophallus paeoniifolius* for Anti-Inflammatory Activity

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ABSTRACT

Background: *Amorphophallus paeoniifolius* (also known as elephant foot yam) is a medicinal plant traditionally thought to help reduce symptoms of inflammation and oxidative stress. **Objective:** This study examined how different solvent polarities relate to extraction yield, the types of phytochemicals extracted, total phenolic and flavonoid content, and in vitro anti-inflammatory properties. **Methods:** To conduct the study, the tubers were macerated in three solvents of varying polarity (methanol, water, and n-hexane). Extraction yields were determined, and the extract was screened for phytochemicals using standard qualitative methods. The total phenolic content (TPC) and total flavonoid content (TFC) were measured. The in vitro anti-inflammatory activity of the extracts was assessed using the albumin denaturation assay with diclofenac as a standard reference. **Results:** The highest extraction yield (74%) and the greatest number of phytochemicals were achieved using methanol as the extraction solvent. Methanol extraction also yielded the highest total phenolic (28.68 ± 0.04 mg GAE/g) and flavonoid (3.15 ± 0.01 mg RE/g) contents among the hexane and water extractions. **Conclusion:** Higher yield and biological activity of the methanol extract may be due to its ability to solubilise a wider variety of bioactive phytoconstituents, particularly phenolics and flavonoids. The anti-inflammatory characteristics of these phytoconstituents are attributed to their ability to inhibit protein denaturation and to reduce oxidative damage to cells. The results indicate that solvent polarity affects both phytochemical yield and biological activity of the extracts which contribute to the anti-inflammatory properties of this plant material.

Keywords: *Amorphophallus paeoniifolius*, anti-inflammatory activity, flavonoid, maceration, methanol, phenolic, polarity

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Polarity-guided fractionation of *Amorphophallus paeoniifolius* identifies extract fractions with enhanced anti-inflammatory activity.

INTRODUCTION

Plants-derived natural products are amongst the most important source of pharmaceuticals used in the prevention and treatment of diseases in human beings. The medicinal plants industry has historically been an important part of traditional medicine worldwide and today makes an important contribution towards the development of new medicines through research and laboratory tests. It is reported by the World Health Organisation that approximately 80 percent of the population of the world utilises traditional herbal medicine as their main mode of treatment.[1] Plants manufacture several chemicals termed as secondary metabolites which may be phenols, flavonoids, alkaloids, terpenoids, glycosides, tannins, and saponins.[2]

Among the various biological activities of plant-derived compounds, antioxidant activity has gained considerable attention due to its significant role in preventing oxidative stress-related disorders. Superoxide anion radicals, hydroxyl radicals, hydrogen

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peroxide, and other free radicals generated by metabolic and enzymatic processes are examples of reactive oxygen species (ROS), which are oxygen-containing molecules.[3] The formation of ROS can be increased by external sources including UV rays, pollutants, smoking, heavy metals, and other toxins. An overproduction of ROS beyond the body's capability to neutralize them leads to oxidative stress and damage to various cell components like lipids, proteins, and DNA.[4] Many chronic illnesses, such as cancer, diabetes mellitus, neurological diseases, and cardiovascular ailments, have been linked to oxidative stress.[5]

These molecules, collectively known as phytochemicals, have been found to exhibit many different properties, making them candidates for novel drug discovery. Currently, there is a lot of research being done on antioxidants and how they work within the human body, especially with regard to their ability to prevent oxidative stress, which is thought to cause several diseases. The generation of ROS in the body arises due to normal biological processes such as superoxide anions, hydroxyl radical, and hydrogen peroxide production as by-products of processes like respiration and enzyme function.[6] Moreover, it has been shown that phenolic compounds can influence signalling pathways related to inflammation, apoptosis, and cellular defence mechanisms.[7] Therefore, the discovery and characterisation of plant-based antioxidants has become the main focus of natural products chemistry, pharmacognosy, and pharmaceutical sciences.

Evaluating the biological activities of phytochemicals is heavily dependent on how well the phytochemical is extracted from plant material. Multiple factors contribute to the success of these extractions, including extraction technique (solvent type, extraction method, temperature, extraction duration, and particle size of the plant material).[8] Of these factors, solvent polarity is most critical to determining the degree and number of phytochemicals extracted from plant tissues. Different types of phytochemicals have varying levels of polarity and solubility; therefore, using an appropriate solvent has a significant impact on the yield of extracted compounds (and thus their biological activity).[9]

Phenolic compounds and flavonoids are typically extracted from plant tissues using polar solvents (like methanol, ethanol, and water), whereas lipophilic compounds (like terpenoids, sterols, and fatty acids) are ideally extracted using non-polar solvents (like hexane or chloroform).[10] Numerous studies have demonstrated that solvent polarity not only influences the phytochemical composition of plant extracts but also affects their antioxidant, antimicrobial, and anti-inflammatory activities.[11,12] Therefore, comparative studies employing solvents with different polarities are essential for optimising extraction conditions and identifying extracts with the highest concentration of biologically active compounds.

In recent years, increasing attention has been directed toward exploring underutilized or less-studied plant species for their phytochemical diversity and pharmacological potential. One such plant is *Amorphophallus paeoniifolius* (Dennst.) Nicolson, commonly known as elephant foot yam. This tropical tuberous plant belongs to the Araceae family and is widely cultivated in several Asian countries including India, China, Indonesia, and Malaysia.[13] The plant is commonly consumed as a vegetable and has long been used in traditional systems of medicine such as Ayurveda and folk medicine for the management of various ailments.

Phytochemical investigations of *Amorphophallus paeoniifolius* have revealed the presence of several biologically active constituents including phenolics, flavonoids, alkaloids, glycosides, tannins, and terpenoids.[14] These phytochemicals contribute to the diverse pharmacological activities reported for the plant. Several studies have demonstrated that extracts of *A. paeoniifolius* possess antioxidant, antimicrobial, anti-inflammatory, gastroprotective, and antitumor activities. The plant's antioxidant activity is primarily attributed to its polyphenolic content, which can effectively scavenge reactive oxygen species and inhibit oxidative damage.[15]

In addition to its pharmacological properties, *A. paeoniifolius* has attracted attention due to its nutritional value and agricultural importance. The plant is widely cultivated as a cash crop because of its high productivity and adaptability to diverse climatic conditions. Its tubers are used in the preparation of various traditional foods and medicinal formulations, and the plant has been recognised as a promising candidate for developing functional foods and nutraceutical products. Understanding the relationship between solvent polarity, phytochemical composition, and biological activity is essential for optimising extraction strategies and maximising the therapeutic potential of medicinal plants.[16] Such studies can provide valuable insights into selecting appropriate solvents for extracting specific classes of bioactive compounds and enhancing the pharmacological efficacy of plant extracts (Table 1).

The current study aims to examine how various solvent extracts affect the phytochemical makeup, antioxidant capacity, and anti-inflammatory capacity of *A. paeoniifolius* tuber. By assessing how solvent polarity affects extraction efficiency and biological activity, this research seeks to identify the most effective solvent system for extracting bioactive compounds from this therapeutic herb and to advance the development of natural therapeutic agents and nutraceutical formulations.

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Table 1: An overview of Previously Reported Phytoconstituents of *A. paeoniifolius* and corresponding Extraction Solvents

S. No.	Country	Year	Plant Name	Reported Phytoconstituents	Extract	Reference
1	India	2025	*Amorphophallus paeoniifolius*	Alkaloids, steroids, fats, flavonoids, carbohydrates, tannins, proteins, saponins	Chloroform, Methanol, Water	[24]
2	India	2025	*Amorphophallus paeoniifolius*	Oxalate	Titrimetric method	[25]
3	India	2023	*Amorphophallus paeoniifolius*	Phenol, flavonoids	Hexane, chloroform, ethyl acetate, acetone, methanol	[13]
4	India	2022	*Amorphophallus paeoniifolius*	Carbohydrates, reducing sugar, steroids, terpenoids, proteins, alkaloids, amino acids, flavonoids, tannins, hexose sugar	Ethanol	[16]
5	India	2017	*Amorphophallus paeoniifolius*	Alkaloids, proteins, flavonoids, phenol, sterol, terpenoids, fixed oil, carbohydrates, fats	Water, methanol, chloroform, petroleum ether	[27]

Food-related and non-food-related variables

Natural functional foods, such as elephant foot yams and the nutritious products made from them, can serve as functional components that improve human health. As omega-3 fatty acids increase the levels of good cholesterol in the blood, EFY is considered a nutritious and low-fat diet high in omega-3 fatty acids. Consumption of elephant foot yam helps maintain hormonal balance by increasing oestrogen levels in women's bodies.[17]

To extract both nonpolar and polar phytoconstituents, we prepared several extracts of *A. paeoniifolius,* commonly known as the "Elephant Foot Yam," using organic solvents in ascending order of polarity. The biological activities of the phytochemicals in the extracts were investigated qualitatively. To determine the most important and optimal plant portion as a promising future source of herbal medications, these extracts were further investigated for their anti-inflammatory properties.

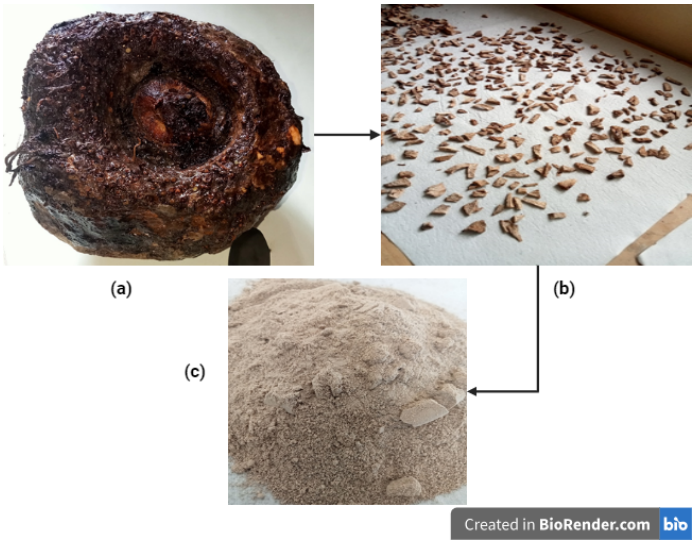


Figure 1: Different forms of *Amorphophallus paeoniifolius* during collection and grinding

MATERIALS AND METHODS

Sample Collection

The botanist identified several organs, including young, fresh, and unripe fruit, from a single sample of *Amorphophallus paeoniifolius*, sometimes known as the "elephant foot yam," collected from a plant nursery in Uttar Pradesh. To preserve their integrity, the samples were kept in polypropylene baskets with labels in a freezer set to 10 °C before being sent to the lab for analysis. Before being washed with deionized water for analysis, the samples were cleansed with water to remove any dust.

Grinding and Drying

Tuber and unripe fruit, two properly chosen and cleaned plant parts (Figure 1), were allowed to air dry for 72 hours at 25° to 30 °C. After being dried, the materials were crushed into a fine powder using a mixer grinder and stored at room temperature in clean, labelled vials for further examination.

Preparation of Tuber Extracts of *Amorphophallus paeoniifolius*

For the extraction process, a total of 174.77 g of dried *A. paeoniifolius* tuber powder was used. This dried powder was divided into three equal portions, each approximately 58.25 g. Each portion was then soaked separately in 400 mL of one of three solvents: water, methanol, or n-hexane. The purpose of using these three solvents of varying polarity was to extract a wide range of chemical components from the tuber.

The tuber powder-solvent mixtures were kept in beakers and maintained at 30-35 °C for 72 hours. This extended soaking period allowed for thorough extraction of the desired compounds

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Table 2: Various Extraction Conditions for *Amorphophallus paeoniifolius* with different Solvents

Method	Solvent	Polarity Index	Temperature (°C)	Time (hrs)	Volume of Solvent (mL)
Maceration	Water	9.0	20–25 (Room Temp.)	72	400
Maceration	Methanol	5.1	20–25 (Room Temp.)	72	400
Maceration	Hexane	0.1	20–25 (Room Temp.)	72	400

from the plant material. After the soaking was complete, Whatman No. 1 filter paper was used to carefully filter each of the three extracts, separating the liquid extract from any remaining solid plant matter.

The filtered extracts were then dried to remove the solvents. This was achieved through a combination of concentration and vacuum drying at 35 °C. The dried extracts were subsequently stored at 4 °C with low humidity to preserve their integrity and potency for future use and analysis. This careful extraction and storage process ensured that the *A. paeoniifolius* tuber extracts would be suitable for the planned phytochemical investigations and bioactivity assessments.[18] The various extraction conditions employed for *A. paeoniifolius* using different solvents are summarised in Table 2.

Extraction Yield

The crude extract's performance is defined as the ratio of the dry mass of the plant extract obtained to the total weight of plant matter processed throughout the experiment. The following formula may be used to compute this yield.[19]

%Yield = extract weight divided by dry powder weight × 100

Phytochemical Screening

Precipitation reactions or colour changes were used as the basis for the phytochemical screening. Plant organs were immediately ground into powder using the Houghton and Raman approach.[20] In addition to phytochemical investigations, the Chemistry lab at Saraswathi College of Pharmacy in Hapur, India, also carried out antibacterial and antifungal activities.

Phytochemicals of Extracts Qualitative Screening: Standard procedures were followed to determine the presence of tannins, terpenoids, saponins, flavonoids, alkaloids, etc. (Table 3).

Total Phenolic Contents (TPC)

TPC (total phenolic content) of the extracts that were diluted (1:10 w/v) was assessed using the Folin–Ciocalteu method. Briefly, 500 µL of each extract was mixed with 2.5 mL of Folin–Ciocalteu reagent (diluted 1:10) and 2 mL of sodium carbonate solution (7.5% w/v). The combination was incubated for 15 minutes at 45 °C and then allowed to sit at room temperature for 30 minutes. The absorbance at 765 nm was measured. Using the gallic acid calibration graph (10–100 mg/L; R2 = 0.9983), TPC was computed and reported as milligrams of gallic acid equivalents (GAE) per gram of extract.[21]

Total Flavonoid Content

To a 10 ml test tube, 0.3 ml of extract, 3.4 ml of 30% methanol, 0.15 ml of NaNO2 (0.5 M), and 0.15 ml of AlCl3 · 6H2O (0.3 M) were taken. To this mixture, 1 mL of NaOH (1 M) was added after 5 min. The mixture was shaken well and the absorbance was read against reagent blank at 506 nm. The total flavonoids standard curve was prepared using a Rutin standard solution (0-100 mg/L) following the same procedure as previously described. The total flavonoids were calculated as Rutin equivalents per g of dried fraction.[22]

Evaluation of anti-inflammatory efficacy in vitro by suppressing albumin denaturation

The albumin denaturation inhibition approach, with slight modifications, was used to study the anti-inflammatory potential of *A. paeoniifolius* tuber. A small volume of 1N HCl was used to adjust the reaction mixture's pH. The reaction mixture contained test extracts and a 1% aqueous solution of bovine albumin. Turbidity was measured at 660 nm after the sample extracts were cooled following 20 minutes of incubation at 37 °C and 20 minutes of heating to 51 °C. The experiment was carried out three times.[23] The percentage inhibition of protein denaturation was calculated as follows:

$$\text{Percentage inhibition} = \frac{(\text{Abs Control} - \text{Abs Sample})}{\text{Abs control}} \times 100$$

RESULTS

Extraction Yield of *A. paeoniifolius* Tuber Extracts

The dried tubers of *A. paeoniifolius* were extracted by maceration using water, methanol, and n-hexane for two days. The solvents were subsequently evaporated using a vacuum air dryer at 35 °C to obtain the respective crude extracts. The methanolic extract showed the highest percentage yield (74%), total phenolic content (28.68 ± 0.04 mg/g GAE), and flavonoid content (3.15 ± 0.01 mg/g RE). The aqueous extract showed intermediate values, while the hexane extract exhibited the lowest yield (20%), phenolic content (12.20 ± 0.07 mg/g GAE), and flavonoid content (0.72 ± 0.01 mg/g RE).

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Table 3: Methods of the qualitative screening of phytochemicals

Phytochemical	Test Name	Procedure	Positive Result Indicator
Alkaloids	Wagner's Test	10 mg extract was treated with 2 mL of Wagner's reagent.	Formation of reddish-brown precipitate
Tannins	Ferric Chloride Test	500 mg of dried sample was heated with 5 mL distilled water, filtered, and a few drops of $FeCl_3$ were added to the filtrate.	Bluish-black coloration
Saponins	Foam Test	200 mg sample was boiled in distilled water and filtered. 10 mL filtrate was diluted with 5 mL water, shaken vigorously, and 3 drops of olive oil were added.	Formation of stable emulsion
Flavonoids	Ammonia Test	10 mL filtrate was mixed with 5 mL of 1.0 M ammonia solution followed by 5–6 drops of concentrated H_2SO_4.	Yellow coloration
Terpenoids	Chloroform–Sulfuric Acid Test	5 mL extract was mixed with 2 mL chloroform, followed by careful addition of 3 mL concentrated H_2SO_4 along the side of the test tube.	Reddish-brown coloration at interface
Carbohydrates	Molisch's Test	2–3 mL extract was treated with 4–5 drops of 5% α-naphthol solution, followed by careful addition of concentrated H_2SO_4 along the side of the test tube.	Formation of purple or reddish-violet ring at interface
Fats & Oils	Solubility Test	Extract was treated with water, ether, benzene, and chloroform separately to observe solubility.	Solubility in organic solvents
Glycosides	Keller–Killiani Test	2 mL extract was treated with 1 drop of 5% $FeCl_3$ and 2 mL glacial acetic acid, followed by careful addition of concentrated H_2SO_4.	Formation of reddish-brown ring at interface

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Phytochemical Screening

Preliminary phytochemical screening was performed to determine the presence of major classes of bioactive constituents in the tuber extracts of *A. paeoniifolius*. Alkaloids, saponins, tannins, flavonoids, terpenoids, and carbohydrates were detected in the extracts, whereas lipids, oils, and glycosides were not detected.

Total Phenolic and Flavonoid Content

The total phenolic content (TPC) of the *A. paeoniifolius* tuber extracts was determined using gallic acid as the reference standard, with absorbance measured at 765 nm. The methanolic extract exhibited the highest phenolic content (28.68 ± 0.04 mg GAE/g), followed by the aqueous extract (15.83 ± 0.03 mg GAE/g) and n-hexane extract (12.20 ± 0.07 mg GAE/g).

The total flavonoid content (TFC) was determined using rutin as the reference standard, with absorbance measured at 506 nm. The methanolic extract showed the highest flavonoid content (3.15 ± 0.01 mg RE/g), followed by the aqueous extract (1.84 ± 0.01 mg RE/g) and n-hexane extract (0.72 ± 0.01 mg RE/g). The comparative total phenolic and flavonoid contents of the different extracts are presented in Figure 2.

In Vitro Anti-inflammatory Activity

The in vitro anti-inflammatory activity of the *A. paeoniifolius* tuber extracts was evaluated using the bovine serum albumin (BSA) denaturation assay at concentrations ranging from 100 to 1000 µg/mL. Diclofenac sodium was used as the standard drug. All extracts showed concentration-dependent inhibition of protein denaturation.

At 1000 µg/mL, the methanolic extract exhibited the highest inhibition of protein denaturation (82.74%), followed by the aqueous extract (73.81%) and n-hexane extract (57.14%). Diclofenac sodium showed 91.67% inhibition under the experimental conditions. Thus, the methanolic extract demonstrated the highest inhibitory activity among the tested plant extracts, although its activity was lower than that of the standard drug. The results are presented in Table 4 and graphically illustrated in Figure 3.

The percentage inhibition of protein denaturation was calculated using the following equation:

% Inhibition = (Absorbance of Control − Absorbance of Sample) / Absorbance of Control × 100

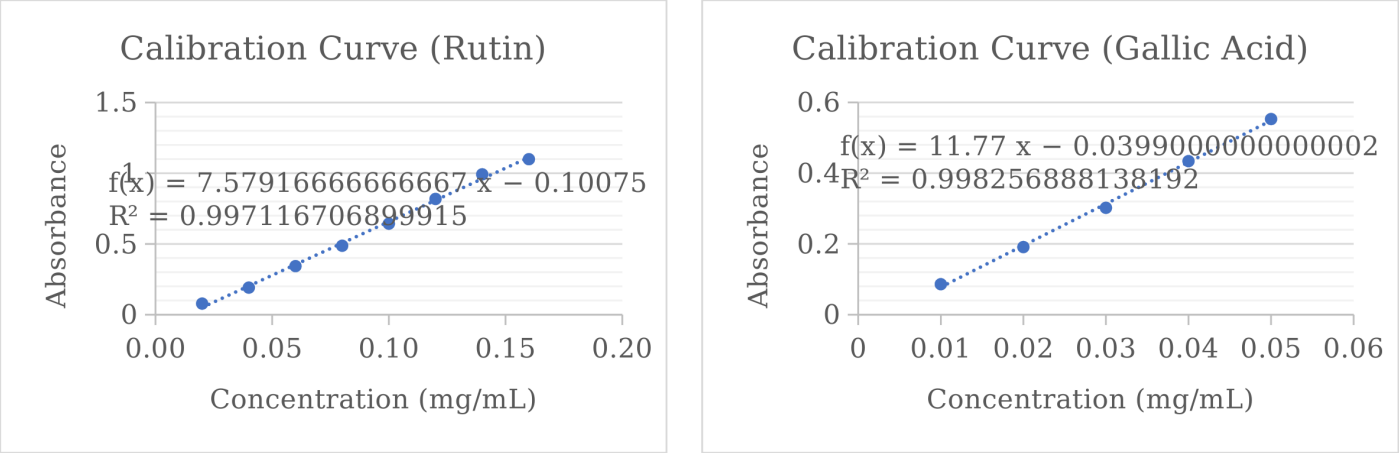


Figure 2: Rutin and Gallic Acid Calibration Curve

Table 4: **Quantitative Data of Bovine Serum Albumin (BSA) In-Vitro Anti-Inflammatory Activity of *A. paeoniifolius* Tuber Extracts**

Concentration (µg/ml)	Mean % Inhibition ± SD			
	Diclofenac	Methanol	Aqueous	Hexane
100	30.95±0.002	21.43±0.002	17.86±0.001	13.1±0.002
200	45.83±0.003	35.12±0.002	29.17±0.005	22.02±0.002
400	54.18±0.003	49.4±0.002	40.48±0.002	29.76±0.002
800	78.57±0.005	64.88±0.002	55.95±0.003	46.43±0.001
1000	91.67±0.004	82.74±0.003	73.81±0.003	57.14±0.001
Values represent mean ± standard deviation (SD) of triplicate experiments.				

DISCUSSION

The results obtained from the present study confirm the possible medicinal uses of *A. paeoniifolius* tuber, especially in terms of its phytochemical profile and its anti-inflammatory activity in vitro. *A. paeoniifolius* is traditionally used in Ayurvedic medicine and the presence of antioxidant and other bioactive constituents are a part of the explanation of its use in traditional therapeutic preparations. The extraction yield was highly dependent on the type of solvent used, the highest being obtained when methanol was used, followed by water and n-hexane. Methanol's better yield might be due to the fact that it can extract a wide variety of polar and moderately polar phytoconstituents from the plant material. The lower yield found from n-hexane might be due to the limited capacity of this non-polar solvent to extract the polar compounds. Therefore, the polarity of the solvents used seems to have a significant effect on the extraction yield of *A. paeoniifolius* tuber and the type of constituent compounds being extracted. Based on the initial phytochemical screening, alkaloids, saponins, tannins, flavonoids, terpenoids and carbohydrates were identified in the extracts tested. The findings of these phytochemical groups suggest that the tuber possesses multiple secondary metabolites which could be responsible for the tuber's biological properties. Specifically, phenolics, flavonoids, tannins and related compounds are known for their antioxidant and anti-inflammatory properties. The quantitative analysis also showed that methanolic extract exhibited the maximum total phenolic and total flavonoid contents of 28.68 ± 0.04 mg GAE/g and 3.15 ± 0.01 mg RE/g respectively. The aqueous extract and n-hexane extract were much lower in the amounts of these constituents. The phenolic and flavonoid contents found in the methanolic extract were higher, which is in accordance with the fact that methanol is effective to extract the polar and moderately polar phytochemicals from the plant. These determine the methanolic extract's relative higher biological activity and may explain the activity of the methanolic extract. All the extracts were found to be concentration dependent in the anti-inflammatory activity measured by BSA denaturation assay. The methanolic extract had the best inhibition (82.74% at 1000µg/mL) followed by the aqueous extract (73.81%) and n-hexane extract (57.14%) while diclofenac sodium had the highest inhibition of 91.67% at 1000µg/mL. The relatively active methanolic extract might be correlated with the presence of more phenolics and flavonoids. The activity observed may be attributed to these compounds for their antioxidant activity, protein stabilising activity and modulating effect on inflammatory pathways. The phytochemical

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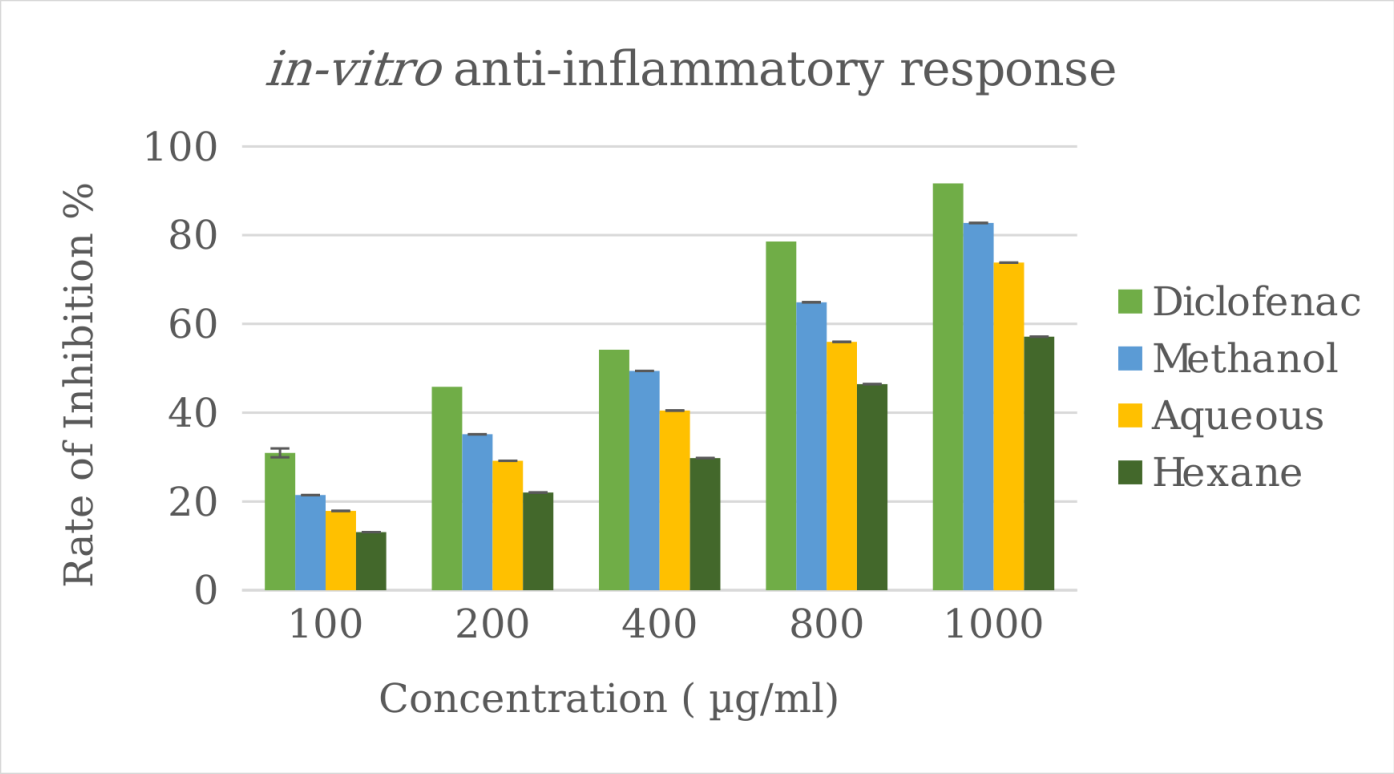


Figure 3: In-vitro anti-inflammatory activity of *A. paeoniifolius* tuber extracts using the bovine serum albumin (BSA) denaturation assay at different concentrations (100–1000 µg/mL), compared with diclofenac sodium as the standard drug.

profile of *A. paeoniifolius* reported in the present study is corroborated by the previous phytochemical investigations, which reported the presence of phenolic compounds, flavonoids, saponins, and alkaloids. It has been reported that the anti-inflammatory action of phenolic constituents and flavonoids can be attributed to various mechanisms such as the scavenging of ROS, and the modulation of inflammatory enzymes and signalling pathways. Some flavonoids and phenols also inhibit cyclooxygenase (COX) and lipoxygenase (LOX) pathways, which might help to decrease the generation of inflammatory mediators, including prostaglandins and leukotrienes. They also possess protein-protein interaction and protein structure stabilising properties which could be responsible for the anti-denaturant activity seen in the present assay. The polarity relationship of the solvents and biological activity along with phytochemical content observed in this study was found to be similar to those of other medicinal plants like *Azadirachta indica, Moringa oleifera and Terminalia chebula*. Methanolic extract from these plants has often shown antioxidant and anti-inflammatory properties that are relatively more potent, which has been attributed to their higher content of phenolic and flavonoid components. These observations further support the possibility that the differences in phytochemical composition between the extracts of the *A. paeoniifolius* in the different solvents might have caused the variation in anti-inflammatory activity observed among the extracts.

CONCLUSION

The findings of the present study demonstrate that the tuber extracts of *A. paeoniifolius* possess significant antioxidant and anti-inflammatory activities, supporting its traditional use in Indian medicinal systems. Among the solvents tested, the methanolic extract exhibited the highest total phenolic and flavonoid contents, which are known to contribute to strong biological activities. The methanolic extract also showed the highest inhibition of protein denaturation in the albumin denaturation assay, indicating considerable in-vitro anti-inflammatory potential when compared with the standard drug diclofenac. These results suggest that the biological activities of *A. paeoniifolius* tuber may be largely attributed to its rich content of phenolic and flavonoid compounds. The results further highlight the importance of solvent polarity in extracting bioactive phytochemicals, as polar solvents such as methanol were more efficient in isolating compounds responsible for antioxidant and anti-inflammatory effects. The observed activities support the potential use of *A. paeoniifolius* as a natural source of therapeutic agents for managing inflammation and oxidative stress-related disorders. However, the present investigation has certain limitations, as it is primarily based on in-vitro phytochemical estimations and biological assays. Detailed phytochemical characterisation using advanced analytical techniques such as High-Performance Liquid Chromatography (HPLC) or Gas

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Chromatography–Mass Spectrometry (GC–MS) would further strengthen the phytochemical profiling of the extracts and help identify the specific bioactive compounds responsible for the observed activities. Moreover, in-vivo pharmacological studies, toxicity evaluation, and isolation of active constituents are necessary to validate its therapeutic efficacy and safety.

All experiments were performed in triplicate (n = 3), and the results were expressed as mean ± standard deviation (SD). Statistical analysis was carried out using one-way analysis of variance (ANOVA) to determine significant differences between groups. This study provides scientific evidence supporting the pharmacological potential of *A. paeoniifolius* and suggests that its tuber extracts may serve as a promising natural source for the development of anti-inflammatory and antioxidant formulations in the future.

CONFLICT OF INTEREST

None

FUNDING

None

AUTHORS CONTRIBUTION

Renu Verma: Conceptualization, Methodology, Writing the original draft. Prottay Dutta: Investigation, Data curation. Abhishek Kumar Singh: Formal analysis, Visualisation. Nishant Gaur: Investigation, Literature review. Ankur Yadav: Data curation, Writing – review and editing. Sudhanshu Mishra: Supervision, Methodology. Shivendra Mani Tripathi: Conceptualization, Supervision, Project administration, review and editing.

All authors approved the final manuscript.

ETHICAL CONSIDERATION

Not Applicable

DATA AVAILABILITY

All the Data are original and no data were taken from any other research.

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LIST OF ABBREVIATIONS

TPC: Total Phenolic Content; **TFC**: Total Flavonoid Content; **GAE**: Gallic Acid Equivalent; **RE**: Rutin Equivalent; **ROS**: Reactive Oxygen Species; **COX**: Cyclooxygenase; **LOX:** Lipoxygenase; **PGG_2**: Prostaglandin G_2; **PGH_2**: Prostaglandin H_2; **EFY**: Elephant Foot Yam; **HCl**: Hydrochloric Acid; **NaOH**: Sodium Hydroxide; **$NaNO_2$**: Sodium Nitrite; **$AlCl_3$**: Aluminium Chloride; **SD**: Standard Deviation; **WHO**: World Health Organisation; **H_2SO_4**: Sulphuric Acid; **$CHCl_3$**: Chloroform; **$FeCl_3$**: Ferric Chloride; **w/v**: Weight/Volume; **µg/mL**: Microgram per Millilitre; **OD**: Optical Density; **°C**: Degree Celsius;

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