

Study of medicinal properties of *Phyllanthus emblica* L. and qualitative and quantitative phytochemicals analysis of fruit and seed of *Phyllanthus emblica* L. in Pandwa Block of Palamu District, Jharkhand, India

Deepak Kumar* & Arpana Sinha

University Department of Botany, Dr. Shyama Prasad Mukherjee University, Ranchi, Jharkhand, India

Received : 12th November, 2024 ; Accepted : 11th December, 2024

DOI:-<https://doi.org/10.5281/zenodo.14969454>

ABSTRACT

Phyllanthus emblica L. is an important tree which has numerous miraculous medicinal properties. It is mainly used in the treatment of several diseases viz., anemia, jaundice and diarrhea etc. It secretes a large number of phytochemicals or bioactive components which help protect of plants as a defensive mechanism from several diseases. Qualitative Phytochemicals study have reported the presence of Alkaloids, Flavonoids, Carbohydrate, Tannins, Saponin which are present in Fruit and seed of *Phyllanthus emblica* L. Cardiac glycoside is absent in fruit and seed. Quantitative phytochemicals analysis of Fruit and seed of *Phyllanthus emblica* L. containing total Phenolic content 729 mg GAE/g of dry extract and 476 mg GAE/g of dry extract respectively, total Tannins were 106 mg TAE/g and 100 mg TAE/g of dry extract and total Alkaloids observed in fruit and seed that were 1833 mg atropine equivalent/g of dry extract and 1889 mg atropine equivalent/g of dry extract.

Key Words - *Phyllanthus emblica* L., Phytochemicals, Qualitative, Quantitative,

*Corresponding author : deepakkumarchouhan222@gmail.com

INTRODUCTION

Plants are an important and wonderful present of nature, they provide an important food source, shelters, and medicines to living-beings (Borah *et al.*, 2022). *Phyllanthus emblica* L. (syn. *Emblica officinalis* Gaertn.), are commonly known as Indian gooseberry belongs to the family Phayllanthaceae. It is a deciduous tree of Phyllanthaceae family, and established as one of the very important indigenous fruits crops of Indian subcontinent (Gocher *et al.*, 2020). Mainly it is widely distributed in India, Pakistan, Sri Lanka, Malaysia, China etc. Fruits are primarily sour and astringent, with bitter and pungent secondary tastes through Ayurveda as well as fruits are often round and

yellow green or bright in colour. People of different language of India, know it as a several names such as amalaka in Sanskrit, amla in Hindi, olay in Punjabi, aamla in Gujarati, nellikkai in Tamil (Gupta & Gupta, 2013). In India, it is extensively utilized in Ayurvedic medicines under name Indian gooseberry and all parts of *Phyllanthus emblica* L. have been widely exercised in a variety of traditional remedies, comprising Indian Medicine (Ayurveda), Chinese Traditional Medicines, Tibetan Medicine, and Greek Arabic Medicine (Halim *et al.*, 2022). *Phyllanthus emblica* L. is very nutritious and is commonly known as a richest sources of Vitamin C as well as it is often

used equally in the form of medicines and as tonic to build up lost vigor and energy. It is usually used to produce cosmetics, confectionaries, commercial beverages and medicinally important value-added products. In India, extensively 10,000 tons of *P. emblica* drupes are industrially used per annum (Malviya *et al.*, 2023; Mishra & Shashi, 2021). In current year, many people are turning their attention towards allopathic medicines because it cures the disease instantly for few times which have a lot of side effects but some people of the world rely on medicinal plants in the traditional system of medicines whose are not having any side effects. However, WHO has usually estimated that up to 80% of the world's population in developing countries rely on plant resources for their primary healthcare. Several parts of dried and fresh fruits of plants are often utilized in traditional Indian medicines having fruits, leaves, seed, root, bark and flowers, all parts of the plants are employed in various Ayurvedic herbal medicines.

Classification

Kingdom	:	Plantae
Class	:	Dicotyledons
Order	:	Malpighiales
Family	:	Phyllanthaceae
Genus	:	<i>Phyllanthus</i>
Species	:	<i>emblica</i>

It has highly effective medicinal properties, fruits and leaves are employed either alone or in combination to treat cold and fever, a diuretic, laxative, liver tonic, refrigerant, stomachic, hair tonic, restorative, anti-inflammatory, antipyretic, immune booster, and as a digestive (Nath & Dhivya, 2019). It is usually prevalent to treat ophthalmic, carminative, alterant, aphrodisiac, rejuvenate, as well as *Phyllanthus emblica* L. is mainly beneficial in distorted conditions, cephalgia, ophthalmopathy, colic, hyperacidity, peptic ulcer, erysipelas, skin diseases, leprosy, emaciation hepatopathy, jaundice, strangury,

diarrhea, dysentery, haemorrhages, intermittent fever, leucorrhoea menorrhagia, cardiac disorders and grey of hair etc. Additionally, fruits are mainly used in gastric problem, anemia and seed oil are often used as coldness of head in the form of massage. *Phyllanthus emblica* L. is a recognized as good source of flavones, tannins, polyphenols and other bioactive compound that are anticancer, antibacterial, expectorant, spasmolytic, purgative, hypoglycaemic and hypolipidemic activities (Patil *et al.*, 2023). Phytochemicals are naturally found in several part of plants viz., leaves, vegetable, roots, stems, barks which they play a very crucial roles for defense, growth and development. Phytochemicals help to protect plant from several types of ailments and pesticides. This paper has highlighted qualitative analysis of Alkaloids, Phenols, Tannins, Proteins, Carbohydrates, Saponins and Flavonoids and quantitative analysis of especially Phenols, Alkaloids and Tannins.

MATERIALS & METHODS

Collection of plant materials

Research work was mainly carried out during 2023 - 2024 from distinct villages of Pandwa, Block of District, Palamu, Jharkhand, India. Brief medicinal properties of *Phyllanthus emblica* L. was identified, analyzed and explored with the collaboration of residents and tribal people of several villages of Pandwa Block by personal interview.



Fig. 1

Fig. 2

Fig. 3

Fig. 1- Tree of *Phyllanthus emblica* L.

Fig. 2- Leaves

Fig. 3- Fruit

Extraction of Plants materials

Plant materials were mainly shade dried till 3 week and after completely drying to made powder. Generally 2 g of each fruit and seed powder mixed 20 ml of Methanol (1: 10). Furthermore, filtered from Whatman's filter paper No.1 and filtrates left overnight for drying and after drying, filtrates scratched by knife or blade and calculated final weight and finally dry extract which was mixed with same amount of Methanol. Ultimately, kept for further qualitative Phytochemicals and quantitative analysis.

Preliminary qualitative Phytochemical Studies.

The preliminary qualitative Phytochemical studies were performed on *Phyllanthus emblica* L. extract for checking the several organic chemical groups present in methanolic plants extracts. The following qualitative phytochemical tests were performed for the detection of organic constituents viz., Alkaloids, flavonoids, phenol, saponins, tannins, carbohydrates, proteins and amino acid

Detection of Carbohydrates

Molisch test (Patil *et al.*, 2023)

2- 3 drops of molisch reagent was usually added in 1 ml of plants filtrates and further more conc. H₂SO₄ was mainly mixed alongside of test tube drop wise, the formation of reddish violet ring at the junction of two layer represents the presence of carbohydrates.

Detection of Alkaloids

Wagner test

Few drops of wagner's reagent were mixed in 1 ml of plants extracts. The formation of reddish precipitate indicates the presence of alkaloids.

Detection of Phenols

Iodine test

Few drops of Iodine reagents were mainly added in 3 ml of plants filtrates, the appearance of transient red color indicates the presence of Phenols.

Detection of Saponins (Subramanian, 2024)

Foem test

1 ml of plant extract was dissolved in 2 ml of dw and shake it. Persistent foem represents the presence of saponins.

Detection of Tannin (Sankhalkar & Vernekar, 2016)

Braymer's test

1 ml of 10% alcoholic Ferric Chloride was often added in 1 ml of Plant extracts. The appearance of blue or green color represents the presence of Tannins.

Detection of Cardiac glycosides

Keller killiani test (Saudagar *et al.*, 2022)

2 ml of filtrates, 3 ml of glacial acetic acid and few drops of 5 % ferric chloride was mixed in test tube and few drops of Conc. H₂SO₄ was added alongside the test tube. The formation of blue color in the acetic layer represents the presence of cardiac glycosides

Detection of Proteins

Xanthoproteic test

Few drops of nitric acid were mixed alongside of wall of test tube in 1ml of plant extracts. The appearance of yellow color represents the presence of proteins.

Detection of Flavonoids

Alkaline reagent test (Malviya *et al.*, 2023)

2 ml of plant filtrates were added with 2 ml of 2% solution of NaOH and furthermore intense yellow color was formed that turned colorless when added few drops of diluted acid that indicates the presence of Flavonoids.

Quantitative Phytochemical analysis

Estimation of total flavonoids content (Subramanian, 2024)

Total flavonoids content was often performed by using of Aluminium Colorimetric method. Quercetin standard solution was prepared by 200, 400, 600, 800, and 1000µg/ml. 0.3 ml of 5% Sodium nitrite (NaNO₂) was mainly added for each, after 5 min 0.3 ml of 10% Aluminium

Chloride (AlCl_3) was added, after that 2 ml of 1 M Sodium hydroxide (NaOH) was frequently mixed to neutralize the reaction. The absorbance was measured for test and standard solutions against blank at 510 nm in UV/Visible spectrophotometer.

Estimation of total alkaloids content (Subramanian, 2024)

1.2 ml of each fruits and seeds sample were taken; to this mix 2.5 ml of Phosphate buffer (PH 4.7) was added for test tube and after that 2.5 ml Bromocresol green solution (BCG) was often mixed and 5ml (2+3) Chloroform taken for mixture firstly 2 ml added in the mixture and filtered further 3 ml chloroform was added for mixture and filtered. The plant extracts were placed in a 10 ml volumetric flask further diluted to adjust volume up to 10 ml with chloroform. Accurately measured aliquates (0.4, 0.6, 0.8, 1, and 1.2 $\mu\text{l}/\text{ml}$) was taken for atropine standard solution as well as standard solution was prepared by 1mg/10 ml dw. The absorbance measured at 470 nm against blank made as above but atropine and sample were mainly taken in triplicate.

Estimation of total Phenolic content

The total Phenolic content (TPC) was mainly performed by spectrophotometric method using of Folin- ciocalteus (FC) calorimetric method. Gallic acid was used in the form of standard solution (1mg/ml). Standard was often prepared by 10, 20,30,40, and 50 $\mu\text{g}/\text{ml}$. Take 10 ml of volumetric flask and add 2.35 ml of distilled water followed by Sankhalkar & Vernekar (2016). To each concentration, 2.5ml FC reagent added, after 5 min 2 ml of 7.5% Na_2CO_3 was mixed and balancing a final volume of 5ml to all and after 90 min incubation period, absorbance was measured at 765nm. Mainly all sample were taken in triplicates, and the average absorbance values obtained at various concentration of gallic acid.

RESULT

Qualitative Phytochemical screening

The Preliminary phytochemical screening or qualitative analysis of fruits and seeds of *Phyllanthus emblica L.* is revealed the presence of Flavonoids, Carbohydrates, Phenols, Alkaloids, Proteins, Saponins, Tannins. Cardiac glycosides are shown (-) ve results on fruits and seeds of *Phyllanthus emblica L.* which is shown in (Table. 1).

Table 1- Representing Result of Qualitative phytochemicals

Name of test	Name of reagent/ test used	<i>Phyllanthus emblica L.</i> Methanolic Extract	
		Fruits	Seeds
Alkaloids	Wagner's reagent test	++	++
Flavonoids	Alkaline reagent test	+	++
Tannins	Braymer's test	++	+
Protein	Xanthoproteic test	+	++
Phenols	Ferric Chloride test	+++	+++
Carbohydrates	Molisch test	+	+
Saponin	Foam test	+	+
Cardiac glycosides	Killer Kelliani test	-	-

+ = Low Present, ++ = Medium Present, +++ = Intense Present, - = Absent

Quantitative Phytochemical estimation

Determination of total Phenolic content

A linear calibration curve (Fig. 4) of gallic acid, in the ranges from 0 - 100mg/ml having ($R^2 = 0.996$, $Y = 0.034x + 0.182$) was demonstrated by follin - ciocalteu method. Ultimately, the total Phenolic content in fruit and seed of *Phyllanthus emblica L.* were calculated 729 mg and 476 mg GAE/gm of dry extract respectively.

Determination of total Tannins content

A linear calibration curve (Fig. 5) of Tannic acid ranges from 0 – 500 mg/ml having ($R^2 = 0.980$, $Y = 0.007x + 0.359$) was demonstrated by Van Burden and Robinson method. Total Tannins content in fruit and seed was obtained 106 mg and 100 mg TAE/g of dry extract respectively.

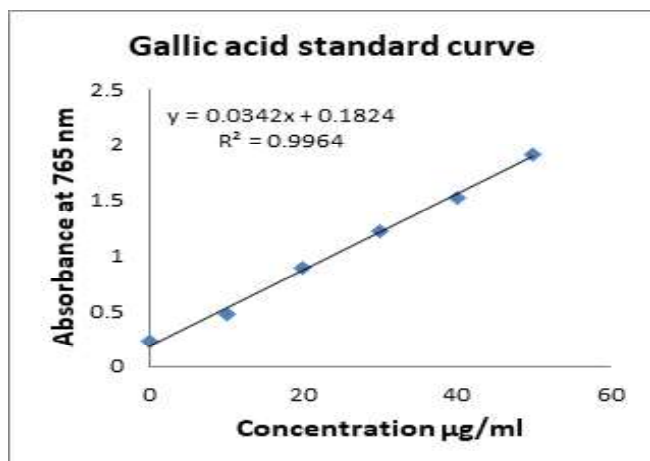


Fig. 4 Calibration curve of standard Gallic Acid

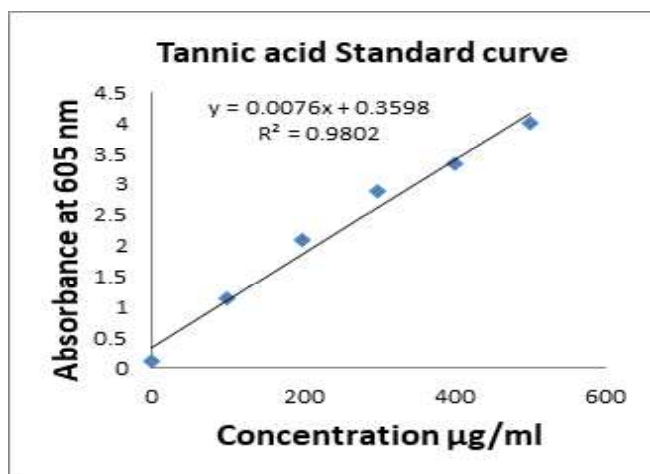


Fig. 5 Calibration curve of standard Tannic

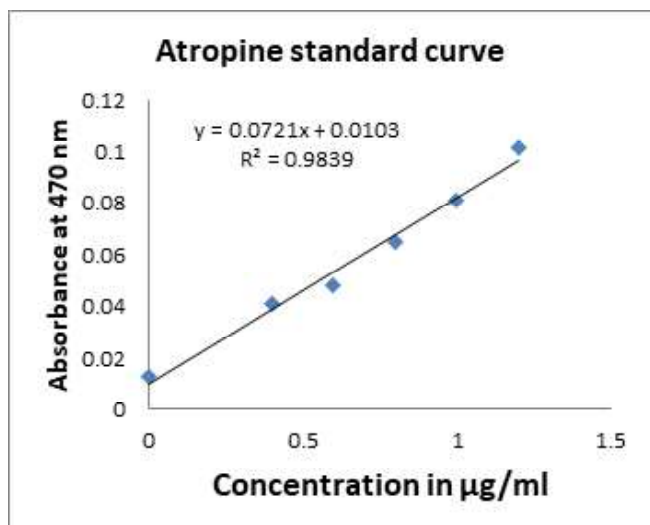


Fig.6 Calibration curve of standard Atropine

Determination of Total Alkaloids content

A linear calibration curve (Fig.6) of atropine from 0 - 120mg/ml having ($R^2 = 0.983$, $Y = 0.072x + 0.010$). Even the total Alkaloids content in fruit and seed of *Phyllanthus emblica* L. were calculated 1833 mg and 1889 mg atropine equivalent/gm of dry extract.

DISCUSSION

Our research showed that Alkaloids, Flavonoids, Phenols, Saponins, Proteins, Carbohydrates and Tannins are present in seed and fruit but Cardiac glycosides showed negative result. Borah *et al.*, (2022) reported the presence of Alkaloids, Phenols, Carbohydrates, Tannins, Flavonoids and Saponins in fruit of *Phyllanthus emblica* L. Their quantitative analysis showed total Phenolic content in fruit and seed was 6.00 mg and 4.53 mg GAE/g extract and total Tannins were 52.96 mg and 126.71 mg TAE/g extract. We observed the total phenolic content in Fruit and Seed were 729 mg GAE/g and 476 mg GAE/g of dry extract respectively. Total tannins content were 106 mg TAE/g and 100 mg TAE/g of dry extract and total Alkaloids content in fruit were 1833 mg atropine equivalent/g and in seed were 1889 mg atropine equivalent/g of dry extract.

CONCLUSIONS

In this paper we have mainly reported qualitative and quantitative phytochemicals analysis of Fruit and Seed of *Phyllanthus emblica* L. Qualitative analysis has shown the presence of Alkaloids, Flavonoids, Carbohydrates, Tannins, Saponins, Phenols and Proteins. Cardiac glycosides were not present in Fruit and Seed of *Phyllanthus emblica* L. Quantitative analysis on fruit and seed were done and observed that the total Phenolic content was 729 mg GAE/g and 476 mg GAE/g of dry extract respectively. Total Tannins content was measured 106 mg TAE/g and 100 mg TAE/g of dry extract. Finally, total Alkaloids content were 1833 mg atropine equivalent/g and 1889 mg atropine equivalent/g of dry extract.

REFERENCES

- Borah, N., Nanda, A. G., & Anagha, A. 2022. *Phyllanthus emblica* (Amla): A review of Nutritional and Medicinal properties. *International Journal of Current Microbiology and Applied Science*. 11(1): 375-389.
- Gocher, M., Gochar, R., Rawat, S., & Rana, D. 2020. Qualitative and Quantities evaluation of *Phyllanthus emblica* L. fruits under Valley condition of Garhwal Himalaya. *Journal of Pharmacognosy and Phytochemistry*. 9(3): 1295-1299.
- Gupta, J., & Gupta, A. 2013. Phytochemical screening of *Phyllanthus emblica* (L.). *Journal of Chemtracks* . 15(1): 117-120.
- Halim, B., Syahputra, R., Adenin, Lubis, H., Mendrofa, F., Lie, S. 2022. Determination of Phytochemical Constituent, Antioxidant Activity, Total Phenol and Total Flavonoids of Extract Ethanol *Phyllanthus emblica* Fruit. *Journal of Pharmacognosy*. 14(1): 63-67.
- Malviya, P., Manjhi, S. K., Ahmad, S. W., Ahmad, S., Singh, S., Barang, S. 2023. Phytochemical screening of *Phyllanthus emblica* leaves. *International Journal of Creative Research Thought*. 11(4): 383-390.
- Mishra, D., & Shashi, D. 2021. Phytochemical Profiling of *Phyllanthus emblica* Leaf Extract. *Journal of Innovation in Applied Research*. 4(3): 17-22.
- Nath, S. G., & Dhivya, D. R. 2019. Phytochemical Analysis, Antioxidant and Antibacterial properties of *Phyllanthus emblica* Leaf Extract against Selected Bacterial Isolates. *International Journal of Science and Healthcare Research*. 4(2): 20-28
- Patil, D. A., Rasve, V. R., Ahemad, S. S., Shirsat, M. K., & Manke, M. B. 2018. Phytochemical Analysis of Methanolic Extract of *Emblica officinalis* leaves. *World Journal of Pharmacy and Pharmaceutical Sciences*. 7(11): 971-978.
- R, P., Subramanian, N., & N, P. 2024. Qualitative and Quantitative Study of *Phyllanthus niruri* L. and Evaluation of its Bioactive Compounds. *Research Journal of Agriculture Sciences*. 15(01):187-193.
- Sankhalkar S., & Vernekar, V. 2016. Quantitative and Qualitative Analysis of Phenolic and Flavonoids Content in *Moringa oleifera* Lam and *Ocimum tenuiflorum* L. *Journal of Pharma cognosy Research* . , Vol.8:16-21.
- Saudagar, I. A., Jahan, F., Shirin, F., Tiwari, A., Pal, A., & Maravi, S. 2022. Investigation of Phytochemicals and determination of compounds of *Phyllanthus emblica* Linn. and *Citrus Limon* (L.) Burm. through proximate analysis and *In-vitro* antimicrobial activity against pathogenic fungi *Aspergillus flavus*. *World Journal of Advanced Research and Reviews*. 14(03): 203-213.