



# PHYTOCHEMICAL INVESTIGATION AND ANTIBACTERIAL ACTIVITY OF METHANOL AND WATER EXTRACTS OF PHYLLANTHUS EMBLICA ( AMALAKI CHURANA )

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## ABSTRACT

The given study focused on phytochemical determination and antibacterial activity of *Phyllanthus emblica*, as traditional medicinal plant in India. The antibacterial activity of methanol and water extract were studied by disc diffusion method (Kirby Baur method) against pathogenic bacterial strains of *Staphylococcus aureus*. Among the solvents used water was used for extraction of tannin and methanol was used for extraction of flavonoid. Phytochemical analysis was done by chemical test. The methanol and water extract inhibit the growth of both strains of *S. aureus*. The result shows that the extract might have potential of Phytochemical constituent and can be used as antibacterial agent.

## KEYWORDS

Phytochemical analysis, extractions, *Staphylococcus aureus*, antibacterial activity

## I. INTRODUCTION

Since ancient times plants used in traditional medicine, and medicinal plants have been essential for the well-being and continued survival of man. The traditional knowledge and use of medicinal plants are widespread from various perspective, like pharmaceuticals. In traditional Indian medicines, all parts of the plant including the fruits, seed, leaves, roots, bark and flowers are used in various preparations. Amla is a well-known Ayurvedic plant used in many traditional systems of medicine<sup>3</sup>. Indian gooseberry (*Emblca officinalis Gaertn*) synonymously known as *Phyllanthus emblica L.*, popularly known as amla, is a widely distributed plant is subtropical and tropical areas of India, China, Thailand and Indonesia. Fruits of amla together with varied parts of the plants are used to treat several diseases and disorders including fever, cold, stomachache, etc. It is also used as an anti-inflammatory, antipyretic, diuretic, hair tonic, laxative, and liver tonic to prevent peptic ulcers<sup>4</sup>. The fruit of amla contains tannins, alkaloids, flavonoids, terpenoids and phenolic compounds which exhibit maximum benefits. In some studies, amla is reported to reduce the cadmium, chromium, and arsenic toxicity induced by oxidative stress and can improve the metal induced clastogenic effects. Tannins are present in fruit pulp. Amla extracts have been extensively investigated for different biological activities. These Phytochemical contribute to the antibacterial, antifungal, antiviral and other pharmacological activities<sup>5</sup>. Research on *Phyllanthus emblica*'s interaction with various pathogenic bacteria indicates potential antibacterial properties. Studies have explored its efficiency against bacteria such as *Escherichia coli*, *Staphylococcus aureus* and *Salomonella*. Amla's bioactive compounds, including polyphenols and tannins<sup>1</sup>, demonstrate antibacterial activity, making it a subject of interest for natural antimicrobial agents. Previous studies have advanced our understanding of the antibacterial properties of *Phyllanthus emblica rasayana*, but a notable research gap remains concerning the antibacterial properties of *Phyllanthus emblica* by using the different strains of *Staphylococcus aureus* (*S. aureus*) and Phytochemicals components present in it. The bioactive compounds present in *Phyllanthus emblica*, such as polyphenols and tannins, have been studied for their ability to inhibit the growth of *S. aureus*. This bacterium is known for causing various infectious, including skin infections and respiratory tract infections. Existing research sheds light on the potential antimicrobial properties of *Phyllanthus emblica*, specifically against *Staphylococcus aureus*<sup>2 (6-7)</sup>.

## II. MATERIALS AND METHODS

### 1. Collection of Ayurvedic drug or churana :

The given *Phyllanthus emblica* churana was directly purchased from Ayurvedic medicinal stores in Akola region having application of infectious diseases.

### 2. Extraction and Isolation :

The 10 gm of churana was extracted with solvent water by boiling on magnetic stirrer for 30 min. to extraction of tannin.

The 10 gm of churana with solvent methanol by using Soxhlet apparatus for flavonoid extraction. Both the extracts were screened for phytochemical analysis of tannin and flavonoid.

### 3. Phytochemical Screening :

#### i. Test for Tannin :

##### Ferric Chloride Test :

0.5 gm extract was stirred with about 10 ml of distilled water and then filtered. Few drops of ferric chloride solution were added to 2 ml of filtrate and observed for the blue- black, green or blue green precipitate.

#### ii. Test for Flavonoid :

##### Lead Acetate Test :

15 mg of the extract was taken in the test tube and few drops of solution was added to and observed for yellow coloured precipitate.

### 4. Antibacterial Assay :

The methanol and water extract was examined for their antibacterial potency by disc diffusion (Kirby Baur method) against two strains of *Staphylococcus aureus*. The strains were collected from Department of Microbiology, Shankarlal Khandelwal College, Akola. Petri plates were prepared with 25 ml of sterile Mueller Hinton Agar. A disc were prepared by using Whatmann filter paper impregnated with methanol and water extract of given churana. 1 ml of bacterial suspension uniformly swabbed over the agar medium. The dried, impregnated disc were placed on this agar with 1 negative control disc and incubate for 24 hrs at 37<sup>o</sup> C. The presence of zone of inhibition surrounding the disc was considered as antibacterial activity of methanol and water extract. The zone of inhibition was recorded in millimetres (mm) by using zone scale.

### RESULT AND DISCUSSION :

The result showed that churana has phytochemical constituent in both methanol and water extract from the analysis it confirm that tannin and flavonoid is present in water and methanol extract respectively (Fig No. 1 and Fig No. 2)

The antibacterial activity of this phytochemical constituent on Mueller Hinton Agar plate shows the zone of inhibition measuring 11 mm and 12 mm of tannin and flavonoid against strain 1 (Fig No. 3) and 11 mm and 13 mm for tannin and flavonoid against strain 2 of *S. aureus* (Fig. No. 4). It indicates that Aala churana used as antibacterial agent as compared to standard medicine.

**Table 1. Antibacterial activity of extracted Phytochemical**

Sr. No.	Extract	Phytochemical Present	Antibacterial activity (zone of inhibition in mm)	
			Strain 1	Strain 2
1.	Amala Methanol Extract	Flavonoid	11 mm	12 mm
2.	Amalal Water Extract	Tannin	11 mm	13 mm

There are many reports in the literature regarding antibacterial activity and Phytochemical analysis. Sini G Nath, R Dahiya et.al. (2019) was invented phytochemical analysis, antioxidant and antibacterial properties of *Phyllanthus emblica* leaf against selected bacterial isolates. SM Moazzem Hossain, Raihan Sarkar et.al. (2014) investigated the scientific basis of the traditional use of the fruit of *Phyllanthus emblica*. Phytochemical analysis of ethanolic fruit extracts *Phyllanthus emblica* showed the presence of flavonoids, alkaloids, tannin, steroids, reducing agent and gum. Various pharmaceutical potential of *P. emblica* has been reported previously including antimicrobial, antioxidant, anti-inflammatory, analgesic and antipyretic, antitumor and antiulcerogenic activities either in combined formulation or *P. emblica* alone.



Fig. no. 1 Extraction of flavonoid by Soxhlet apparatus Fig No. 2 Phytochemical extraction



Fig. No. 3 Strain 1



Fig. No. 4 Strain 2

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