

## ORIGINAL ARTICLE

# Phytochemical analysis and antimicrobial activity of *Terminalia arjuna* roots

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## ABSTRACT

By using the agar diffusion technique, various solvent extracts of *Terminalia arjuna* were investigated for antibacterial activity against *Escherichia coli* and *Staphylococcus aureus*. Different solvent extracts of *Terminalia arjuna* were subjected to a qualitative test for phytochemical analysis. The ethanolic extract of *Terminalia arjuna* had the best antibacterial activity against all of the organisms tested, and it also passed the preliminary phytochemicals analysis. By using the agar diffusion technique, various solvent extracts of *Terminalia arjuna* were investigated for antibacterial activity against *Escherichia coli* and *Staphylococcus aureus*. Different solvent extracts of *Terminalia arjuna* were subjected to a qualitative test for phytochemical analysis. The ethanolic extract of *Terminalia arjuna* had the best antibacterial activity against all of the organisms tested, and it also passed the preliminary phytochemicals analysis.

**Keywords:** *Terminalia arjuna*, roots, antimicrobial activity, agar diffusion method, Phytochemical test

## 1. INTRODUCTION

Infectious illnesses continue to be a serious public health concern across the globe. Antibiotics were manufactured by a number of pharmaceutical firms, but they were found to be resistant to a wide range of microbes. For the prevention of drug resistance, alternative phytomedicine is urgently needed. Medicinal plants include a number of secondary metabolites that have the ability to stop pathogenic bacteria from multiplying and growing. More than 50% of medication is produced from plants, and plant-based therapy is more effective than manufactured pharmaceuticals across the globe. [1].

The treatment including phytochemicals has extremely few adverse effects and has shown substantial inhibitory effectiveness against harmful bacteria.

## 2. MATERIALS AND METHODS

### Plant material and preparation of Plant extracts:

Taxonomist, Department of Botany, Yeshwant Mahavidyalaya, Nanded-431602, Maharashtra, identified and validated the plant *Terminalia arjuna* collected from Bhokar region, Dist. Nanded, Maharashtra.

*Terminalia arjuna* roots were collected and dried in the shade. The dried root was ground into a fine powder using a mixture grinder. The fine powder of the plant was extracted using the Soxhlet apparatus and several solvents, including water, ethanol, and chloroform. Finally, the extracted material was concentrated and placed to use for various purposes.

### Phytochemical test:

Using a conventional procedure, several solvent root extracts of *Terminalia arjuna* were evaluated for phytochemical analysis [2].

### Test microorganisms:

The test microorganisms (*Escherichia coli* and *Staphylococcus aureus*) utilised in this investigation were acquired from the culture collection centre at S. R. T. M. University,

Nanded-431606, Maharashtra. The obtained bacterial cultures were subcultured many times in nutrient broth and incubated for 24 hours at 37°C.

### Antibacterial activity:

The antibacterial activity of different solvent extracts of *Terminalia arjuna* was evaluated using the disc agar diffusion technique. For spreading on agar medium, a subcultured bacterial suspension prepared in nutrient broth is employed. On a sterile paper disc, 1 mg, 2 mg, and 5 mg of concentrated different extracts were used to determine the antibacterial activity of the chosen plant [3]. After adding the sample, the plates were left for an hour to allow the extract to diffuse. The plates were cultured for 24 hours at 37°C in an incubator, and the inhibitory zone was measured in millimetres (mm). For comparison, gentamycin 5 mg/ml was employed as a reference.

## 3. RESULTS AND DISCUSSION

In water, ethanol, and chloroform extracts of *Terminalia arjuna*, preliminary phytochemical examination revealed the presence of saponin, phenols, tannins, saponins, terpenoids, flavonoids, alkaloids, and coumarins, with the exception of glycosides in water extract.

Table 1 shows the findings of the phytochemical analysis. The presence of a high concentration of phytochemicals in the plant results in a greater level of biological activity.

**Table 1. Preliminary phytochemical analysis of root extract of *Terminalia arjuna***

Sr. No.	Phytochemical Test	Root extract of <i>Terminalia arjuna</i>		
		Water Extract	Ethanol extract	Chloroform extract
1	Saponins	+	++	+
2	Phenols	+	++	+
3	Tannins	+	++	+
4	Glycosides	-	++	+
5	Terpenoids	+	++	+
6	Flavonoids	+	++	+
7	Alkaloids	+	++	+
8	Coumarins	+	++	+

**Table 2. Antibacterial activity of root extract of *Terminalia arjuna***

Sr. No.	Microorganisms	Zone of Inhibition (mm)			
		Root extract of <i>Terminalia arjuna</i>			
		Water extract	Ethanol extract	Chloroform extract	Gentamycin (5 mg/ml)
1	<i>Escherichia coli</i>	4	9	2	11
2	<i>Staphylococcus aureus</i>	5	7	4	12

Table 2 shows the antibacterial activity of various *Terminalia arjuna* extracts. When compared to Gentamycin, the ethanolic extract of *Terminalia arjuna* had the highest antibacterial activity, whereas the water extract and chloroform extract had moderate activity. The presence of a variety of phytochemicals may be responsible for a significant inhibition zone. Antibacterial action is due to the presence of flavonoids, alkaloids, terpenoids, phenols, saponins, and coumarins. According to several research publications [4], high levels of phytochemicals and bioactive substances indicate a greater potential medicine for inhibiting a variety of harmful bacteria.

#### 4. CONCLUSION

According to the findings, the ethanolic extract has the highest activity, which might be attributed to the presence of chemical constituents responsible for antibacterial activity, as well as the fact that the majority of the compounds are soluble in ethanol. further research is needed, to identify and purify chemicals from *Terminalia arjuna* root extract. This work which might be used as an alternative to the synthetic commercial antibiotics.

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#### Conflict of interest

No conflict of interest influenced in this research.

#### 5. REFERENCES

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