

Phytopharmacognostic, Antibacterial Activity of Different Extract of Terminalia Arjuna Roxb Leaves

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Abstract

The wealth of India is stored in the broad natural flora which has been gifted to her. Endowed with a variety of agro-climatic conditions, India is a virtual herbarium of the world. The importance of medicinal and aromatic plants has been emphasized from time to time. It is accepted that the drug of natural origin shall play an important role in health care, particularly in the rural areas of India. India is having a high knowledge of phototherapy from Ayurveda, and still, hundreds of potent drugs are yet to be evaluated scientifically. Keeping this in view, we reviewed one of the potential trees whose leaves and other parts also have a potent traditional application, but it has not been much studied.

Keywords: Terminalia Arjuna Roxb, Pharmaco-Chemical, Antibacterial Activity.

Introduction

Terminalia arjuna Roxb (Combretaceae) tree is usually referred to as Arjhan and Arjun in Bengal, India. It is an outsized tree, often with buttressed trunk, smooth gray bark and about 20 - 25 m in tall. The leaves of Arjhan are usually sub-opposite, oblong or elliptic-long, pale dark green above and pale-brown beneath, 10 - 20 cm long and hard. The flowers are yellowish-white, while the fruits are 2.5 - 5.0 cm ovoid or ovoid-oblong, fibrous-woody, and glabrous. It is common on the banks of rivers, streams and dry watercourses in sub-Himalayan tract, West Bengal as well as in central and south India. The skin of the plant is known to contain a crystalline compound, arjunine, a lactone, arjunetin, essential oil and reducing sugar.

Besides these, Terminalia arjuna Roxb tree also contains 34 % calcium carbonate, 9% of other salts of calcium, 13% tannin and aluminum, magnesium, organic acids, colouring matter and other substances [5]. The fruits of the plants are used as a tonic in traditional medicine in India, [2]. Externally, its leaves are used as a cover on sores and ulcer. The bark of Terminalia arjuna Roxb tree is anti-dysenteric, antipyretic, astringent, cardio tonic, lithotriptic and tonic [1] while the powder of the bark acts as a diuretic in cirrhosis of the liver and provides relief in symptomatic hypertension. A decoction of the thick bark made with milk is given every morning on an empty stomach or its powder with milk and gur as a cardio tonic [4]. The bark powder is additionally given with honey in fractures and contusions with echymosis. Furthermore, the extract of the skin, as an astringent, is used for cleaning sores, ulcers and cancers, etc. An ointment made up of the bark by mixing with honey is used to cure acne while the ashes of the bark are prescribed in scorpion stings [3].

Material and method

The fresh leaves of Terminalia arjuna Roxb are collected from Kada, District Beed. The fresh leaves were dried under shade, powdered and undergo 40 mesh sieves and stored in a closed bottle for further use. The powder was extracted with water, ethanol, chloroform, acetone and petroleum ether by Sechelt apparatus.



Ash analysis:

Ash values are helpful in determining the standard and purity of crude drugs, is particularly in powder form [8].

Total ash:

About 3.0 g. Powder of Terminalia arjuna Roxb leaves was accurately weighed and taken in a silica crucible, which was previously ignited and weighed. The powder was to scatter as a fine, even layer on the bottom of the crucible. The crucible was incinerated slowly by increasing temperature to make it dull red hot until free from carbon. The crucible was cooled and weighed. The procedure was repeated to get constant weight [7].

Water soluble ash:

The ash obtained as described within the determination of total ash was boiled for five minutes with 25 ml of water. The matter which is insoluble was collected on ash less filter paper and washed with hot water. The insoluble ash was taken into silica crucible, ignited for 15 minutes and weighed. The procedure was repeated to get constant weight. Subtract the weight of insoluble matter from the weight of the total ash. The difference of weight was considered as water soluble ash .

Acid insoluble ash:

The water soluble ash was boiled with 25ml of 2N HCl for 5 minutes. Then the insoluble ash was collected on an ash less filter paper and washed with hot water. The insoluble ash was collected into a silica crucible, ignited and weighed. The procedure was repeated to get constant weight [9].

Extractive value

Extractive value of crude drug is useful for their evaluation, especially when the constituents of a drug cannot be readily estimated by any others means. Further, these values indicate the nature of constituents present in crude drug [10]. Phyto-chemical analysis was carried out for all the extract as per the standard methods [11].

Antibacterial activity

Bacterial Strains: The test organisms were purchased from NCIM, NCL Pune. Bacteria were incubated at 37 °C in incubator for 24 hrs. They were further stored at 4 °C in the refrigerator to maintain stock culture. Here qualitative antimicrobial screening was carried out using the cylinder-plate or cup-plate method [6].

Result and discussion

For present investigation sample leaves of Terminalia arjuna were taken and burnt completely in the presence of oxygen. The ash was weighed till constant weight is obtained. Total ash observed is 8.63 %. Further ash was treated with HCl and acid insoluble ash was found to be 3.95 %. Similarly, water soluble ash found to be 1.52 %. The ash represents the presence of metal oxide [Table.1]. The extractive value of Terminalia arjuna tree leaves was taken and extracted with various solvent like water, ethanol, chloroform, and acetone and petroleum ether. The extractive value of water is 19.20 %, in chloroform is 11.01%, in ethanol is 23.25 %, in acetone is 9.90 % and petroleum ether shows extractive value of 1.40 % shown in Table.2.

Phytochemical analysis shows that all extract shows the presence of carbohydrate, alkaloid, glycosides, phytosterols, phenol, tannins, flavonoids, saponins, protein and amino acid this is represented in Table.3. The antibacterial activity of aqueous, ethanol, chloroform, acetone and petroleum ether extract was investigated using cup plate method against the selected bacteria such as staphylococcus aureus, salmonella typhimurium,



P. Vulgaris, pseudomonasaeruginosa, B. Megaterium out of five extract three shows varying degree of antibacterial activity against pathogens shown in Table.4 .

Table.1: Ash analysis of Terminaliaarjunaleaves.

Sr. No.	Type of ash	Percentage(w/w)
1	Total ash	8.63%
2	Acid insoluble ash	3.95 %
3	Water soluble ash	1.52 %

Table.2: Percentage of extractive value of Terminaliaarjunaleaves.

Sr. No.	Type of extractive value	Percentage(w/w)
1	Water	19.20%
2	Ethanol	23.25 %
3	Chloroform	11.01 %
4	Acetone	9.90 %
5	Petroleum ether	1.40 %

Table.3: Phytochemicals present in various extracts of Terminaliaarjunaleaves

Name of chemical constituent	Water	Ethanol	Chloroform	Acetone	Petroleum Ether
Carbohydrate	+	+	+	+	+
Alkaloids	+	-	+	+	+
Glycosides	+	+	+	+	-
Saponins	-	+	+	-	+
Phytosterols	+	-	-	+	-
Phenols	+	-	+	+	+
Tannin	+	+	+	-	+
Flavonoids	+	+	+	+	+
Protein and amino acid	+	-	+	+	+

Table 4: Antibacterial activity of Terminaliarjunaleaves in a different solvent.

Sr. No.	Name of organism	Aqueous extract mm	Ethanol extract mm	Chloroform extract Mm	Acetone extract mm	Petroleum ether extract mm
1	Staphylococcus aureus	9	-	-	7	-
2	Salomonella typhimurium	-	-	-	9	-
3	Proteus vulgaris	7	4	-	5	-
4	Pseudomonas aeruginosa	7	5	-	6	-
5	B.megaterium	6	6	-	5	-

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