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# Phytochemical screening of medicinal plants occurring in local area of Assam

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**Abstract**
Medicinal plants have bioactive compounds known as phytochemicals that play an important role in curing and healing of various diseases in human. These phytochemicals have antifungal, antibacterial, antioxidant, anti-inflammation activities. The present study involves three different medicinal plants *Artocarpus heterophyllus* (Kathal), *Carica papaya* (Papaya) and *Terminalia bellerica* (Bhumura) locally available in Assam, India. The methanolic extract of leaf samples were used for the phytochemical screening to find out the phytochemical constituents in the plants. The main objective of the research work was to check the presence or absence of the phytochemical constituents in all the selected medicinal plants. The results of the phytochemical screening of these medicinal plants showed that the tannin, saponin, flavonoid, terpenoid, alkaloid, steroid, glycosides and protein e were found to be present in afore mentioned medicinal plants. Commercially, the phytochemical analysis is important for the pharmaceutical companies for the production of the new drugs for curing of various diseases. The study revealed that the three indigenous medicinal plants are the source of important phytochemicals which will be very useful in the curing of various diseases of this region.

**Keywords:** Phytochemicals, antioxidant, medicinal plants, *Artocarpus heterophyllus*, *Carica papaya* and *Terminalia bellerica*

## Introduction
Phytochemicals are the bioactive non-nutritive, chemical compounds occurring naturally in plants during metabolic processes. The word 'phyto' is derived from the Greek word *phyto* which means plant. Generally these compounds enable the plants to interact with the environment and may act as a defense system against physiological and environmental stress as well as predators and pathogens. The presence of these bioactive phytochemicals are said to confer them with resistance against bacterial, fungal and pesticidal pathogens. Several of these secondary plant metabolites have beneficial effect in food product and metabolism (Berhan and Getachew, 2009) [4]. The beneficial effects of phytochemicals may arise from activation of feed intake and secretion of digestive secretions, immune stimulation, anti-bacterial, coccidiostatic, anthelmintic, antiviral, anti-inflammatory activity and inhibition and antioxidant (Mahato and Sen, 1997) [7]. Most of these active plants phytochemicals can be classified into sub-groups according to their chemical structure, which include terpenoids (e.g. carotenoids), phytosterols, polyphenols (e.g. tannins, flavonoids, phenolic acids) and glucosinolates (Tiwari *et al*., 2013) [13]. Papaya (*Carica papaya*), Jackfruit (*Artocarpus heterophyllus)* and Bhumura (*Terminalia bellerica)* are the locally available trees in Assam.
*Carica papaya* is a herbaceous plant with prominent leaves (20-60 cm long), and is a member of the Caricaceae family, indigenous to the tropical region of Mexico, Central America and northern South America. *C. papaya* is distributed throughout the tropics and subtropics where it is extensively cultivated. It is commonly known as "Paw paw" and "Papaya". The bioactivity of *C. papaya* is owed mainly to its phytochemicals, papain enzyme, vitamins namely vitamin A, C, alkaloid, glycosides, polysaccharides, saponins, flavanoids, phenolic compounds (Varisha *et al*., 2013) [14].
The *Artocarpus heterophyllus* (Jackfruit) is a species of tree of the mulberry family Moraceae. The plant is commonly known as "Kathal". Different classes of flavonoids are abundant in the Jackfruit plant and high content of flavonoids and phenol seems to have a high potential for antioxidant activity (Lin *et al*., 2000) [6]. The plants of *Artocarpus* species have been used by traditional folk medicine and can be useful as anti-bacterial, anti-diabetic, anti-inflammatory, antioxidant and anthelmintics, antifungal, immunomodulatory effect, anticholinergic, chelating activity, cosmetic agent, ACE inhibitors, protease inhibitors, inhibition of melanin biosynthesis and wound healing properties.

*Terminalia bellerica* commonly known as "Bhumura" or "Baheda" belonging to the family Combretaceae is a large deciduous tree. The phytochemicals in Bhumura has multifarious properties like analgesic, anticancer, antidepressant, antidiabetic, antidiarrhoeal, antiulcerative, immunomodulator, antifertility, antifungal, antimicrobial, anti inflammatory, and most importantly antioxidant activity. The antioxidant property of *T. bellerica* is due to falvonoid and polyphenols (Yadav *et al*., 2014) [15].

## Materials and Methods

### Plant materials

The present study included plant species which were *Artocarpus heterophyllus*, *Carica papaya* and *Terminalia bellerica*

### Sample collection

Three medicinal plants were collected locally from the six different places of Assam. Fresh, tender and disease free leaves of selected plants were used for phytochemical analysis.

### Preparation of plant extract

The leaves of the selected plants were removed from the plants and then washed under running tap water followed by distilled water to remove dust. The plant samples were then air dried for few days and the leaves were crushed into powder and stored in polythene bags with proper labeling for further use.

Methanolic plant extract was prepared using 50% methnol. For preparation of methanolic plant extract, 2 g of finely grounded plant leaves were taken in a 100 ml of beaker. To this 40 ml of 50% methanol was added and covered with aluminium foil. The beaker was placed in water bath for 1 hr at 50 $^0$C and stirred with glass rod to prevent lumping. Extract was filtered using double layered Whatman paper No.1 filter paper into a 500 ml volumetric flask. The volume was made up to 500 ml using 50% methanol and stored at 4 $^0$C with proper labeling.

### Phytochemical screening of the plant leaves

Preliminary phytochemical screening was carried out using standard methods:

### Tannins

Lead acetate test - to few drops of 1% lead acetate 2 ml of extract was added. A yellowish colouration indicated the presence of tannins.

### Saponins

Frothing test - 5 ml of extract was mixed with 20 ml of distilled water and then agitated in a graduated cylinder for 15 minutes. Formation of foam indicated the presence of saponins.

### Flavonoids

$H_2SO_4$ test: A fraction of extract was treated with concentrated sulfuric acid and observed for the formation of reddish or orange colour.

### Terpenoids

Salkowski test- 1ml of extract was added to 1ml of chloroform and filtered. To the filtrate 1ml of acetic acid was added and then few drops of conc. Sulphuric acid run down the side of test tube. Brown colour showed presence of terpenoids.

### Alkaloids

Wagner's test - Extracts were dissolved in dilute hydrochloric acid and filtered. Then the filtrates were treated with Wagner's reagent (Iodine in Potassium Iodide). Formation of brown/reddish precipitate indicated the presence of alkaloids.

### Steroids

Salkowski test -1 ml of the extract was dissolved in 10 ml of chloroform and equal volume of concentrated sulphuric acid was added by sides of the test tube. The brown colour indicated the presence of steroids.

### Glycosides

Keller-Kiliani test - 5ml of extract was dissolved in 2ml chloroform. To that few drops of dilute $H_2SO_4$ was added to form a layer. A brown colour indicated the presence of glycoside

### Proteins and amino acids

Xanthoproteic test**:** The extracts were treated with few drops of conc. Nitric acid. Formation of yellow colour indicated the presence of protein.

## Results and discussion

In this present study screening of phytochemicals in *Artocarpus heterophyllus (*Jackfruit), *Carica papaya* (Papaya) and *Terminalia bellerica* (Bhumura) were carried out and the results are presented in Table 1.

**Table 1**: Screening of phytochemicals in methanolic extract of *Artocarpus heterophyllus* (Kathal), *Carica papaya* (Papaya) and *Terminalia bellerica* (Bhumura)

| Sl. No. | Phytochemicals | Test for detection | Coloured reaction | *Artocarpus heterophyllus* | *Carica papaya* | *Terminalia bellerica* |
|---|---|---|---|---|---|---|
| 1 | Tannin | Lead-acetate test | Yellow | +ve | +ve | +ve |
| 2 | Saponin | Frothing test | Formation of froth | +ve | +ve | +ve |
| 3 | Flavonoid | $H_2SO_4$ test | Reddish/orange | +ve | +ve | +ve |
| 4 | Terpenoid | Salkowski test | Brownish | +ve | +ve | +ve |
| 5 | Alkaloid | Wagner's | Brown/ reddish | +ve | +ve | +ve |
| 6 | Steroid | Sakowski test | Brown | +ve | +ve | +ve |
| 7 | Glycoside | Keller Killiani test | Brown | +ve | +ve | +ve |
| 8 | Protein | Xanthoproteic test | yellow | +ve | +ve | +ve |

+ve indicates presence of phytochemicals

Preliminary phytochemical analysis of *Artocarpus heterophyllus* (Kathal), *Carica papaya* (Papaya) and *Terminalia bellerica* (Bhumura) revealed the presence of tannin, saponin, flavonoid, terpenoid, alkaloid, steroid, glycosides and protein etc. in all the three plant leaves. Similar findings were also reported by Ayoola and Adeyeye

(2010) [3], Nazial *et al*. (2015) [8], Patil *et al*. (2014) [10] and Raaman (2015) [12] in papaya, Abraham *et al.* (2014) [1] in Bhumura and Hari *et al*. (2014) [5] in Jackfruit.

Tannins present in *Artocarpus heterophyllus (*Jackfruit), *Carica papaya* (Papaya) and *Terminalia bellerica* (Bhumura) have been reported for its wound healing properties, these are anti-inflammatory and analgesic (Ayinde *et al*., 2007) [2] and antioxidant (Okwu and Okwu, 2004). Terpenoids are reported to have anti-inflammatory, anti-viral, anti-malarial, inhibition of cholesterol synthesis and antibacterial properties. Flavonoids are useful in the treatment of coronary heart disease. Plants having alkaloids are used in medicines for reducing headache and fever. These are attributed for antibacterial and analgesic properties (Pietta, 2000) [11].

## Conclusion

The selected three medicinal plants *Artocarpus heterophyllus* (Kathal), *Carica papaya* (Papaya) and *Terminalia bellerica* (Bhumura) are the source of the secondary metabolites i.e., alkaloids, flavonoids, terpenoids, tannins etc. The antidiuretic, anti-inflammatory, antianalgesic, anticancer, anti-viral, anti-malarial, anti-bacterial and anti-fungal activities of the medicinal plants are due to the presence of the above mentioned secondary metabolites. Screening of medicinal plants for phytochemicals leads to the discovery of a new drug. Thus, the present study revealed that these three plants can be used in the treatment of various diseases as they contain phytochemicals.

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