



## TRIPHALA – REVIEW OF PHYTOCHEMICAL CONSTITUENTS AND PHARMACOLOGICAL ACTIVITIES

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### ABSTRACT

Today, pharmaceutical scientists are experiencing difficulty in identifying new lead structures, templates, and scaffolds in the finite world of chemical diversity. A number of synthetic drugs have adverse and unacceptable side effects. We are getting more and more dependent upon and have become practically intoxicated with drugs. Many drugs are failing due to untoward or toxic effects, and the quest for better and safer drugs continues even more aggressively. In the Indian subcontinent, documentation and use of medicinal plants started

during the Vedic period of which more than 100 medicinal plants is found. *Charaka Samhita* and *Sushruta Samhita* contain detailed descriptions of over 800 medicinal herbs and over 8000 formulations. *Triphala* is the most common ingredient of over 400 formulations indicated for diabetes-like conditions. The possible mechanism of Triphala in diabetes is through lipid peroxide inhibition, free radical scavenging. Triphala is the drug of choice for the treatment of several diseases, especially those of metabolism, dental and skin conditions, and for wound treatment.

**KEYWORDS:** Triphala, phytochemical, pharmacological.

### INTRODUCTION

Triphala means three fruits. It is a 2000-year-old conventional ayurvedic herbal drug. It can be administered to all age groups because ingestion of Triphala is reckoned to be assuaged to human body.<sup>[1]</sup> Thence, an endeavor has been made, to sum up, the superfluous spectacular effectiveness of three fruits. Triphala is a standout amongst the most flexible ayurvedic

medication utilized as a part of India. Triphala is local to the Indian subcontinent and comprises equivalent amounts of three myrobalan fruits taken without seed, in particular, Amalaki (*Emblica officinalis Gaertn*), Bibhitaki (*Terminalia bellirica Gaertn*), and Haritaki (*Terminalia chebula Retz*). It is an Ayurvedic herbal composition that has global invigorating powers and is gainful for an expansive scope of illnesses. As far back as 1500 BC, Triphala has immeasurable references in antediluvian India in Sushruta Samhita. Howbeit, surrogate vantages of this herb are much more crucial. It contains five of the six tastes perceived in Ayurveda (sweet, sour, bitter, pungent and astringent) solitarily missing the salty taste. Triphala is relegated as a “tridoshic rasayana”, implying that the energetics is relevant for body humors Vaata, Pitta, and Kapha for a wide range of patients.<sup>[2]</sup>

### **Amalaki or Amla<sup>[3]</sup>**

Amla, also known as Indian gooseberry, is identified botanically as *Emblica officinalis Gaertn* and also *Phyllanthus emblica Linn*. In Sanskrit, it is also called as Dhatri (the nurse) distinguished due to its incredible healing properties. It is consumed in various forms, from pickles and preserves to yogurt coalesced with amla fruit powder. Amla is as well the most fertile natural source of vitamin C in the form of ascorbic acid containing 600 mg per 100 grams in an easily edible form. Amla is a super food made up of over 80% water and it has very less calories. It has manifested to be an efficacious herbal medicine for the intervention and hindrance of eye disease, cancer, digestive problems, and diabetes. It also functions as diuretic, liver tonic, restorative and anti-inflammatory. It also comprises of protein, fiber, phosphorous, iron, carotene and vitamin B complex and gallic acid according to the Indian Council of Medical Research.

### **Phytochemical constituents of Amla/ *Emblica officinalis*<sup>[4,5]</sup>**

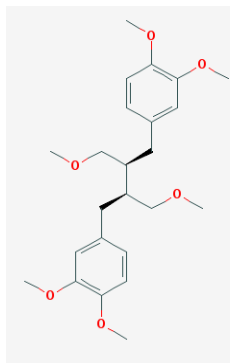
Phyllanthin, phyllemblin, Phyllemblic acid B, Phyllemblic acid C, Glutamic acid, Proline, phyllantidin, Aspartic acid, Alanine, Cystine, Lysine, Pectin, Quercetin, Kaempferol, Gallic acid, Ellagic acid, methyl gallate, Trigallayl glucose, ascorbic acid, Pyrogallol, Punigluconin, Pedunculagin, Emblicanin-A & B, Chebulagic acid, Chebulinic acid, Corilagin, Geraniin, chebulic acid, Ellagitannin.

### **Pharmacological activity of Amla / *Emblica officinalis*<sup>[4,6,7,8,9]</sup>**

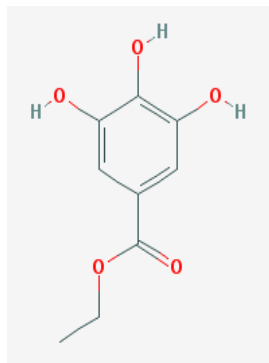
*Emblica officinalis* – anti-oxidant, anti-aging, cardioprotective, anti-inflammatory, anti-cancer, immune-modulatory, anti-diarrheal, anti-diabetic, anti-microbial, anti-viral, ulcer protective, wound healing, nephro-protective, hepatoprotective, memory enhancer, anti-

amnesiac, hair growth enhancing, anti-hyper cholesterolemic, anti-pyretic, analgesic, anti-tussive, gastro-protective.

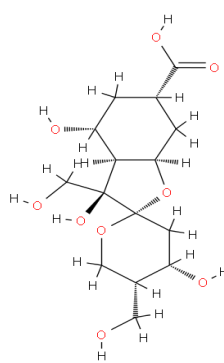
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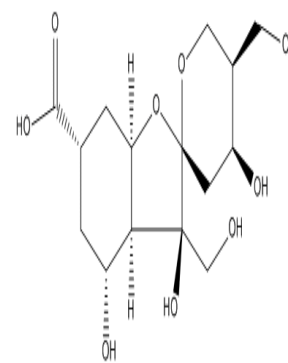
Phyllemblin



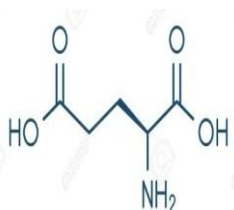
Phyllaemblic acid B



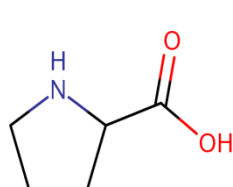
Phyllemblic acid C



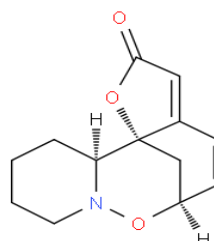
Glutamic acid



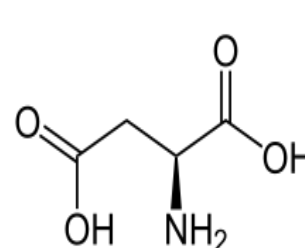
Proline



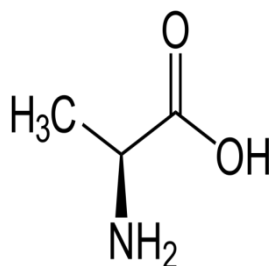
Phyllantidin



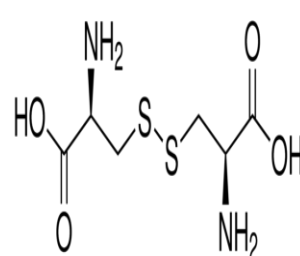
Aspartic acid



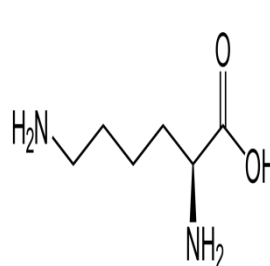
Alanine



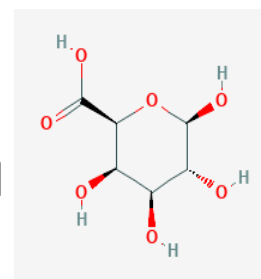
Cystine



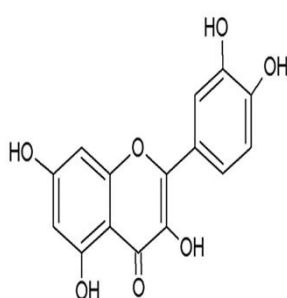
Lysine



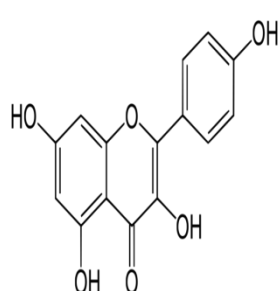
Pectin



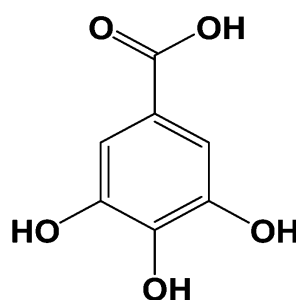
Quercetin



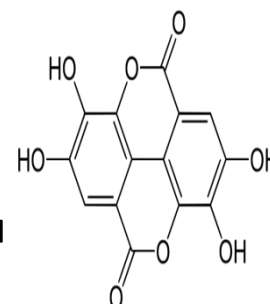
Kaempferol

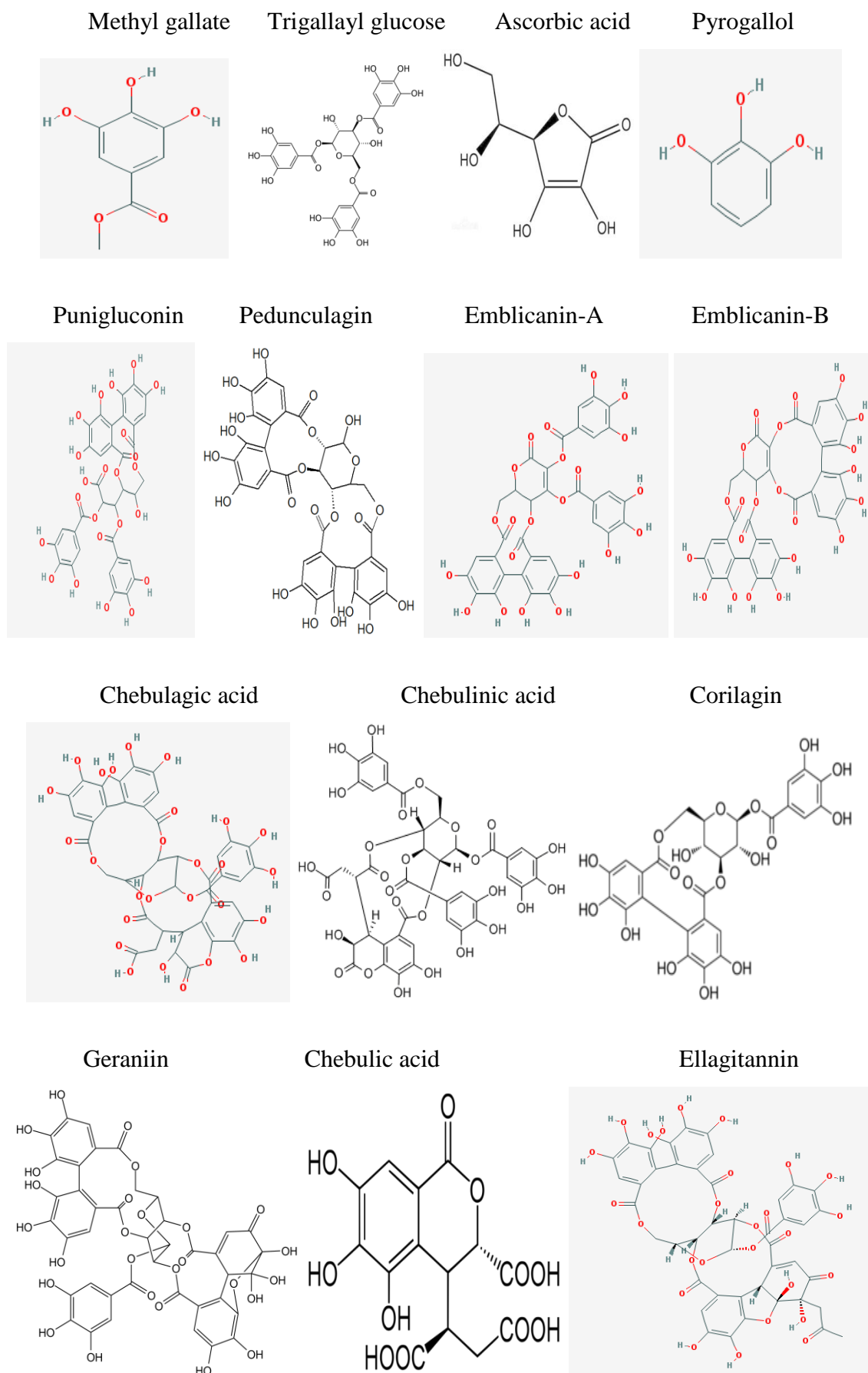


Gallic acid



Ellagic acid





**Fig. 1: Phytochemical constituents of *Emblica officinalis*.** [10,11]

**Bibhitaki or Baheda**

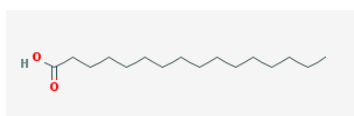
The botanical name is *Terminalia bellirica* and it is strong laxative herbaceous plant. By nature, it is astringent, sweet and also heating. It is a restorative to “Kapha” and is believed to amend conditions of vitiated voice.<sup>[12]</sup> Baheda is a potent ancient rejuvenator with detoxifying calibers on the body muscles, blood, and tissues with fat in the body. It treats diabetes, high blood pressure, & rheumatism. Bibhitaki is extremely feasible with circumstances necessitating redundant mucose tissue in the system and is also beneficial for featured bone formation.<sup>[13]</sup>

**Phytochemical constituents of Bibhitaki / *Terminalia bellirica***<sup>[14,15]</sup>

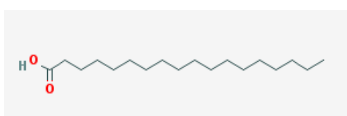
Palmitic acid, stearic acid, myristic acid, linoleic acid, oleic acid, Quercetin, Kaempferol, 7-hydroxy 3', 4'(methylenedioxy)flavone, luteolin, mannitol, glucose, fructose, sucrose, galactose, mannose, rhamnose, arabinose, termilignan, anolignan B, hydroxy-3',4'-[methylenedioxy] flavan, gallic acid, ellagic acid, methyl gallate, ethyl gallate, galloyl glucose, gallo-tannic acid, chebulagic acid, shikimic Acid, hexahydroxydiphenic acid, belleric acid, arjungenin, dehydro-shikimic acid, arjunolic acid, terminoic acid, quinic acid

**Pharmacological activity of Bibhitaki / *Terminalia bellirica***<sup>[14,15,16]</sup>

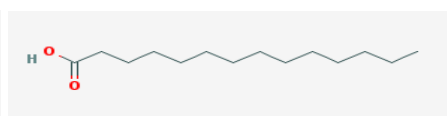
Anti-oxidant, anti-microbial, glucoamylase, anti-diarrhoeal, anti-diabetic, analgesic, anti-hypertensive, anti-salmonella, anti-spasmodic & bronchodilatory, hepatoprotective, wound healing, immunological, anti-biofilm, anti-cancer, anti-ulcer, anti-thrombotic, thrombolytic, anti-pyretic, anti-mutagenic, anti-fungal, anti-Alzheimer, anti-atherogenic, anti-fertility, anti-plasmodial, anti-depressant, cytogenetical effect etc.



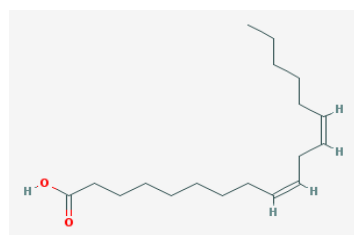
Palmitic acid



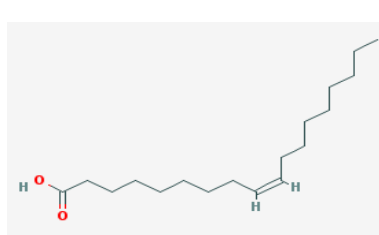
Stearic acid



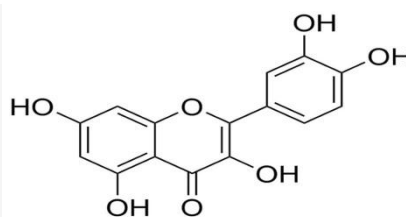
Myristic acid



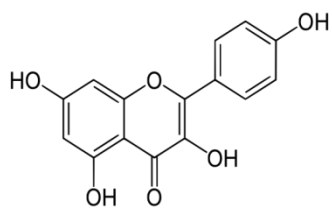
Linoleic acid



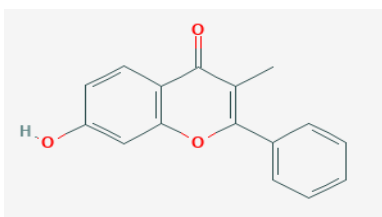
Oleic acid



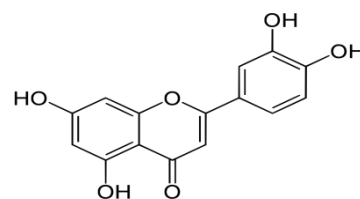
Quercetin



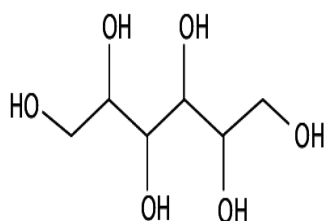
Kaempferol



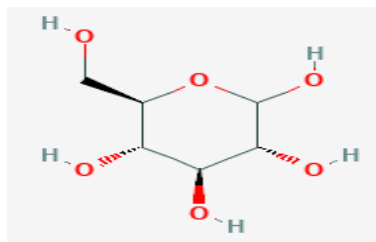
7-hydroxy 3', 4'-(methylenedioxy)flavones



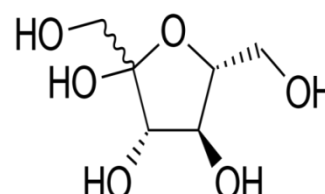
Luteoline



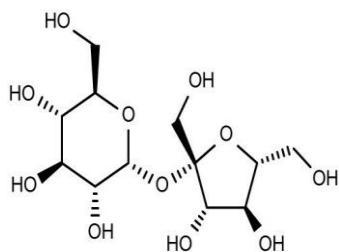
Mannitol



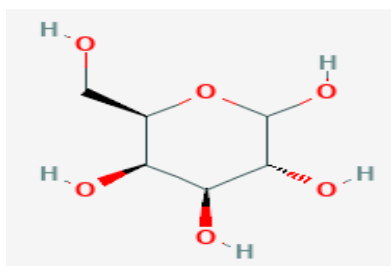
Glucose



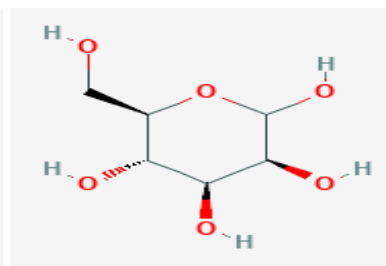
Fructose



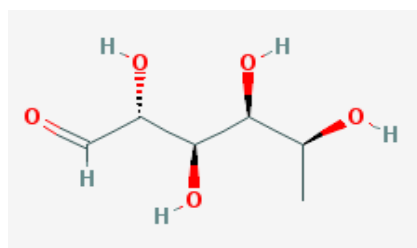
Sucrose



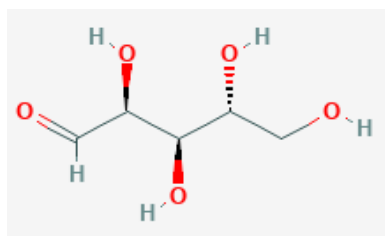
Galactose



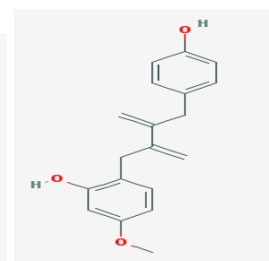
Mannose



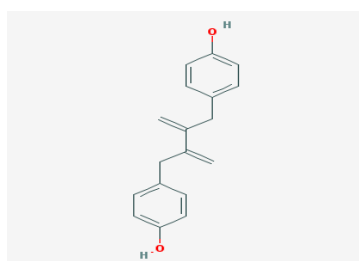
Rhamnose



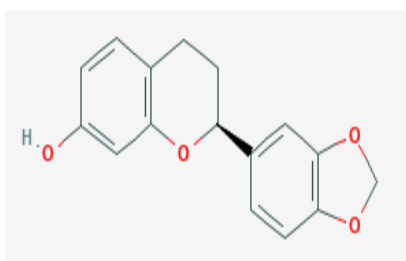
Arabinose



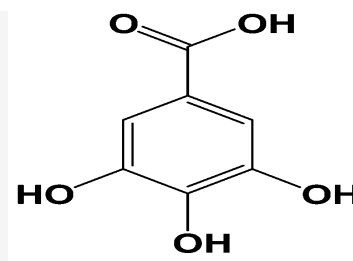
Termilignan



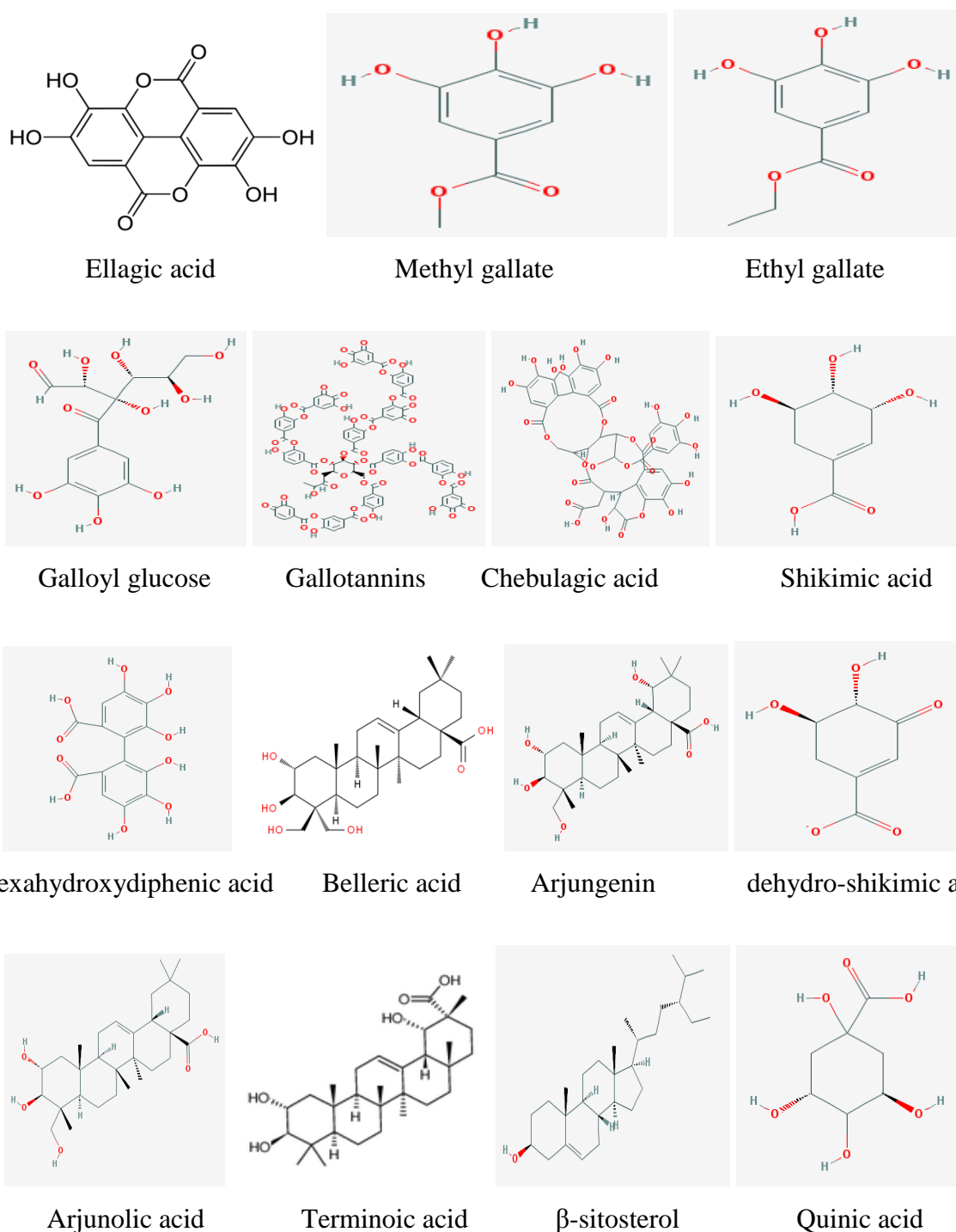
Anolignan B



Hydroxy-3',4'-[methylenedioxy] flavan



Gallic acid



**Fig. 2: Phytochemical constituents of *Terminalia bellirica*.**<sup>[10,11]</sup>

### Haritaki or Harada<sup>[17,18]</sup>

The botanical name is *Terminalia chebula* Retz. It is conceived as one of the most significant ayurvedic herbaceous plant whilst it has an astringent and unpleasant taste. Harada has been used widely for many centuries in both Ayurvedic and Tibetan medicine. It is named as “king of medicine” in Tibetan medicine. Many delineations of the healing form show a handful of Haritaki. It is a potent anti-fungal, anti-bacterial as well as antiviral and also it is

anti-inflammatory. It turns down the blood sugar levels and enhances insulin sensitivity. It is a best redressal for skin problems, for hair loss and dandruff. It also treats constipation, dementia & diabetes.

It is believed to have,

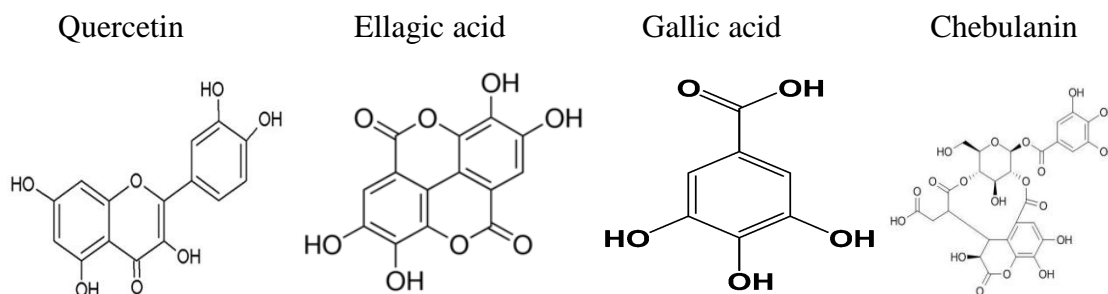
- A variety of positive health effects on the heart & brain.
- It decreases stomach acidity and guards against ulcers.
- It reduces the risk of developing stomach ulcer because of antioxidant property of gallic acid and ellagic acid in it.

### Phytochemical constituents of Haritaki / *Terminalia chebula*<sup>[19,20]</sup>

Quercetin, Ellagic acid, Gallic acid, Chebulanin, Chebulagic acid, Chebulic acid, Chebulinic acid, Punicalagin, ethanedioic acid, Corilagin,  $\beta$ -D-glucogallin, glucose, sorbitol, terchebulin, terflavin A, terflavin B, arjungenin, arjunglucoside-I, arjunin, p-coumaric acid, caffeic acid, vanillic acid, succinic acid, ferulic acid, phloroglucinol, pyrogallol, galloyl glucose, maslinic acid, beta-sitosterol.

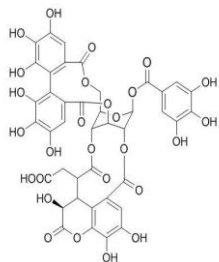
### Pharmacological activity of Haritaki / *Terminalia chebula*<sup>[21,22]</sup>

Anti-oxidant, depigmenting agent, anti-inflammatory, reduces cellular aging, anti-bacterial, anti-fungal, anti-amoebic, immunomodulatory, anti-viral activity, anti-mutagenic, anti-carcinogenic, anti-diabetic, retinoprotective, anti-anaphylactic, antinociceptive activity, antiulcerogenic, anti-arthritic, wound healing, cytoprotective, radioprotective activity, cardioprotective, hepatoprotective, chemopreventive, hypolipidemic, hypercholesterolemic activity, antispermatogenic activity, and purgative.

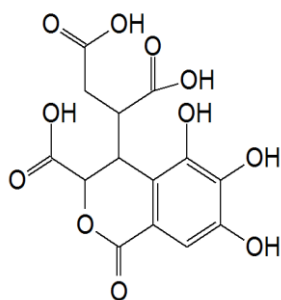




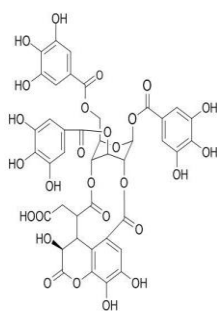
Chebulagic acid



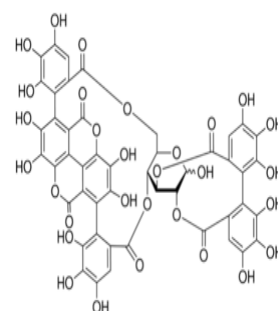
Chebulic acid



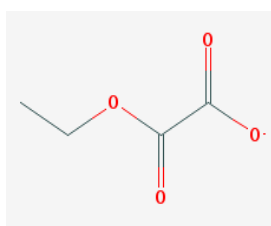
Chebulinic acid



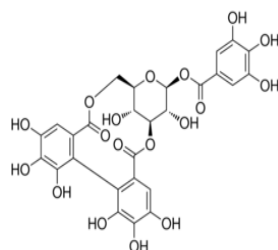
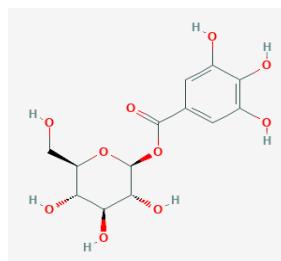
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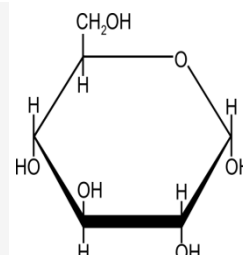
Ethanedioic acid



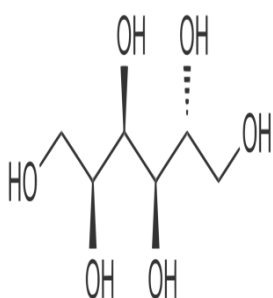
Corilagin

 $\beta$ -D-glucogallin

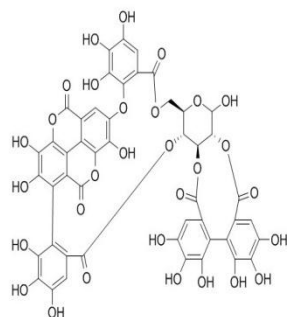
Glucose



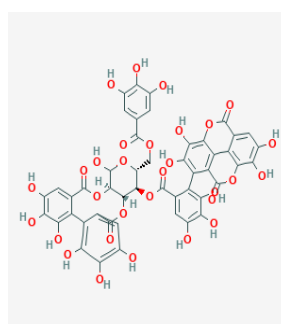
Sorbitol



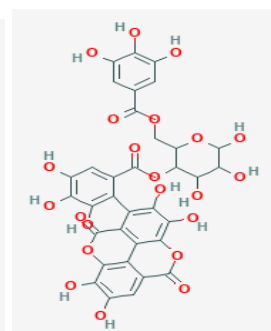
Terchebulin



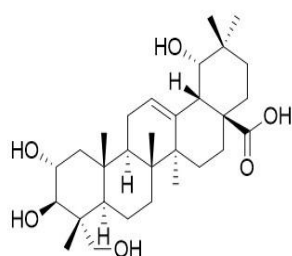
Terflavin A



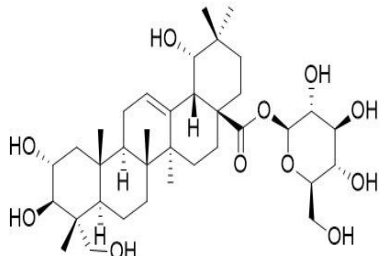
Terflavins B



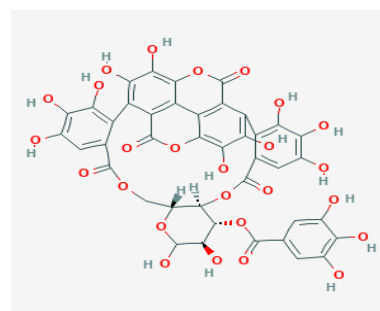
Arjungenin

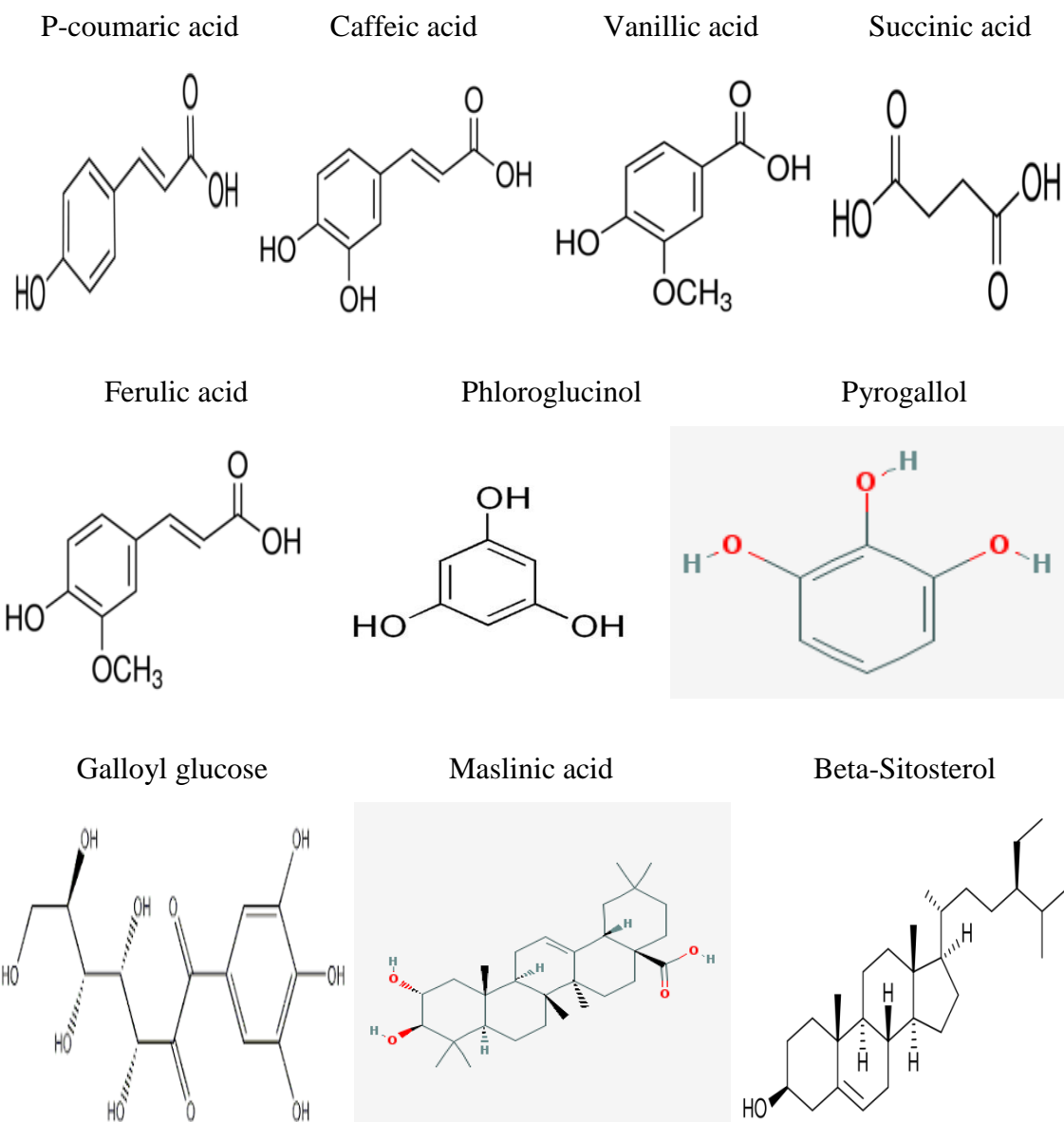


Arjunglucoside-I



Arjunin





**Fig. 3: Phytochemical constituents of *Terminalia chebula*.** <sup>[10,11]</sup>

## CONCLUSION

The utilization of herbal meds is expanding globally thus Triphala can go about as a restorative aid. Triphala is an intense polyherbal convention with countless effectual therapeutic uses and additionally the forbiddance and intervention treatment of ailments. Recuperative attributes of Triphala are valuable and powerful in the wellspring of treatment for different sickness. Numerous logical examinations have detailed proof-based approval of different customary employments of Triphala. Triphala is not a substitute for however can be utilized alignment to coetaneous dentistry, diabetes and so on. The mix of the two currents of treatment will act unitedly for overall welfare of the patient in oral and general wellbeing. It gives restorative incentive to different health problems. It is viable in the administration of

overall wellbeing without any contrary impact so helps in viability, security, availability and command over ailment henceforth can be attempted in restorative issues. We trust that conventional information-roused approach might be a solace to the pharmaceutical field.

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