TRIPHALA: A HERBAL FORMULATION

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Abstract Herbal remedies are among the most ancient medicines used in traditional systems of healthcare such as Ayurveda. *Triphala*, a well-recognized and highly efficacious polyherbal Ayurvedic medicine consisting of fruits of the plant species *Emblica officinalis* (*Amalaki*), *Terminalia bellerica* (*Bibhitaki*), *and Terminalia chebula* (*Haritaki*), is a cornerstone of gastrointestinal and rejuvenative treatment.

Key Words: Ayurveda, anti-inflammatory, immunomodulating, microbiota, antioxidant, antimicrobial.

INTRODUCTION

Medicinal plants are of great importance to the health of individuals and communities. The medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human body (Edeoga *et al*., 2005). Phytochemicals is defined in the strictest sense, as chemicals produced by plants. There has been an increased interest in phytochemicals for the purpose of human health and other benefits in the food industry. Phytochemical screening of diet plants is very important in identifying source of therapeutically and industrially important compounds. It is imperative to initiate an urgent step for screening of plants for secondary metabolites.

Triphala is a well-recognized and revered polyherbal medicine consisting of dried fruits of the three plant species *Emblica officinalis* (Family Euphorbiaceae), *Terminalia bellirica* (Family Combretaceae), and *Terminalia chebula* (Family Combretaceae) that are native to the Indian subcontinent. It is classified as a tridoshic rasayana in Ayurvedic medicine as it promotes longevity and rejuvenation in patients of all constitutions and ages. Ayurvedic medicine uses Triphala as a pillar of gastrointestinal treatment; however, the complexity of the three rasayanas, or rejuvenative herbs, in the formulation allows for many applications. Moreover, studies done by Peterson *et al*., (2017) have validated a number of potential uses of Triphala, which include free radical scavenging, antioxidant, anti-inflammatory, immunomodulating, appetite stimulation, gastric hyperacidity reduction, dental caries prevention, antipyretic, analgesic, antibacterial, antimutagenic, wound healing, anticariogenic, anti-stress, adaptogenic, hypoglycemic, anticancer, hepatoprotective, chemprotective, radioprotective, and

chemopreventive effects. Triphala may also promote proper digestion and absorption of food, reduce serum cholesterol levels, improve circulation, relax bile ducts, prevent immunosenescence, maintain homeostasis of the endocrine system, and increase production of red blood cells and haemoglobin.

The present study is an attempt to identify the phytochemicals present in Triphala and its three constituents and to understand the health benefits of Triphala. Therefore this study is designed to screen the phytochemicals present in *Emblica officinalis, Terminalia bellirica*, *Terminalia chebula* and Triphala with the objective of observing, understanding and analysing their importance in human health.

MATERIALS AND METHODS

The present survey was carried out to get a knowledge about the plants used and the phytochemicals present in the Ayurvedic drug "Triphala". The informations were collected from ayurvedic medical practitioners and from literature. This study was conducted to know more about the medicinal plants used, uses, used parts and the phytochemicals responsible for pharmacologial effects.

The plants materials present in "Triphala" include *Emblica officinalis, Terminalia bellirica, Terminalia chebula.*

1. ***EMBLICA OFFICINALIS*** Gaertn.

Scientific classification	
Kingdom	Plantae
Family	Euphorbiaceae
Genus	*Emblica*
Species	*Officinalis*
Binomial Name	*Emblica officinalis*

2. ***TERMINALIA BELLIRICA*** (Gaertn.) Roxb.

Scientific Classification	
Kingdom	Plantae
Family	Combretaceae
Genus	*Terminalia*
Species	*bellirica*
Binomial Name	*Terminalia bellirica*

3. Terminalia chebula

Scientific Classification	
Kingdom	Plantae
Family	Combretaceae
Genus	*Terminalia*
Species	*Chebula*
Binomial Name	*Terminalia chebula*

PLANT	DESCRIPTION	USES	PHYTOCHEMICALS
EMBLICA OFFICINALIS Gaertn.	Amla is a tree native to India.This is a small deciduous tree. The leaves are small, linear and obtuse and appear like pinnate leaves. The flowers bloom in February to May. The flowers are greenish yellow in colour. The fruits are fleshy, globular with 6 obscure, vertical furrows. The fruits when ripe are yellow in colour.	The fruits being rich is vitamin C are extensively used in man formulations of Ayurveda. The fruits are good tonic for general vitality. Amla forms an important part of Triphala, a well-known Ayurvedic medicine for good health and improving body resistance. The fruits either fresh or dried are used as Ayurvedic medicine.	Terpenes Saponins, Flavonoids Tannins.

TERMINALIA BELLIRICA (Gaertn.) Roxb.	A lofty tree often with butteresses. Flowers greenish yellow, sessile on slender axilliary short pedunculate spikes. Fruit is a fleshy drupe obovoid or subglobose with grey-velvety wooly hairs and a hard thick wall. 1 seeded and surrounded by a green tissue.	The bark is reportedly used in treating anemia and leucoderma. Fruits are reported to be effective in curing cough, bronchitis, insomnia, dropsy, dyspepsia, flatulence, vomiting, skin diseases, leprosy, fevers, ulcers and general debility. The mature and dry fruit is constipating and is useful in diarrhea, dysentery and rheumatic, swellings. The fruit pulp finds use in ophthalmia.	Tannins, Glycosides
TERMINALIA CHEBULA Retz.	Trees 10-15 m tall. Leaves pubescent, ovate-oblong, obtuse at apex, rounded at base. Flowers greenish- white, fragrant in terminal spikes. Fruits greenish-yellow, ovoid. Stone is very thick, bony, rough, grooved with gum vessels on the wall.	The fruits are laxative and reported to be used for treating wounds, ulcers, inflammations, gastropathy, flatulence, jaundice, skin diseases, leprosy, intermittent fever and cardiac disorders. The fruit pulp is used in denitrifrices.	Phenolics Saponins Alkaloids, Flavonoids Tannins Glycosides.

RESULTS AND DISCUSSION

PHYTOCHEMICAL SCREENING

Phytochemicals have been found to possess a wide range of activities, which may help in protection against chronic diseases.The various phytochemicals present were analysed from the literature collections. The phytochemicals present in the four aqueous extracts of *Emblica officinalis*, *Terminalia bellirica*, *Terminalia chebula* and "Triphala" are shown below in Table:1

TABLE : 1

Sl. No	Test	*Emblica officinalis*	*Terminalia bellirica*	*Terminalia chebula*	Triphala
1	Terpenes	+	-	-	+
2	Phenolics	-	-	+	+
3	Saponins	+	-	+	+
4	Phlobatannins	-	-	-	-
5	Alkaloids	-	-	+	+
6	Flavonoids	+	-	+	+
7	Proteins	-	-	-	-
8	Tannins	+	+	+	+
9	Glycosides	-	+	+	+
10	Volatile oils	-	-	-	-
11	Reducing sugar	-	-	-	-

= '+' indicates the presence of phytochemical constituent.

= '-' indicates the absence of phytochemical constituent.

The phytochemical screening of *Emblica officinalis* confirmed the presence of Terpenes, Saponins, Flavonoids, and Tannins while *Terminalia bellirica* contains Tannins and Glycosides. *Terminalia chebula* confirmed the presence of Phenolics, Saponins, Flavonoids, Tannins, Alkaloids and Glycosides. Triphala confirmed the presence of Terpenes, Phenolics, Saponins, Flavonoids, Tannins, Alkaloids and Glycosides.

Triphala is novel dietary or natural chemopreventive formulation. Triphala possesses a good amount of therapeutically important phytoconstituents. These phytoconstituents are believed to be responsible for various therapeutic uses of Triphala powder. Triphala is considered as the most potential Ayurvedic formulation by the practitioner but as far as our knowledge on the

study of Triphala goes, it is exploited for its potential use as an immunomodulatory, anti-diabetic, anti-mutagenic, and anticancerous properties.

Based on the results of the phytochemical screening, *Emblica officinalis* contains phytochemicals such as tannins, flavonoids, saponins, and terpenes. The phytoconstituents are believed to be responsible for the various therapeutic uses of Triphala powder. Pragati *et al*., (2003) reported about 43% sugar contents in dried fruits of *Emblica officinalis.* Its most extraordinary features are its anti-inflammatory and antioxidative properties. Scientifically, various pharmacological effects have been studied, suggesting the clinical importance of this plant species. The traditional use of this fruit enforces its effects on almost all of the human ailments, but very few of them have been validated through clinical research and still the vast majority of these traditional uses are yet to be proved through the systematic researches.

Terminalia bellirica contains glycosides and tannins. Fruits are anti-inflammatory, antihelmintic, expectorant, antipyretic, antiemetic and useful in asthma and bronchitis, dropsy, dyspepsia, cardiac disorders, skin diseases, leprosy, ulcer. Triphala is rich in nutrients including ascorbic acid, sugars and starch (Kumar *et al*., 2018).

The extract of *Terminalia chebula* contains phytochemicals such as flavonoids, glycosides, alkaloids, phenolics, saponins and tannins. *Terminalia chebula* has been documented as a rich source of tannin (Chang and Lin, 2011). The literature survey showed that the plant exhibited antioxidant, hepatoprotective, antispasmodic, cardioprotective and immunomodulatory activities. Thorough screening of literature available on *Terminalia chebula* depicted the fact that it is a popular remedy among the various ethnic groups, vaidyas, hakims and Ayurvedic practitioners for cure of ailments (Gupta *et al*., 2010).

Phytochemical screening revealed that the extracts of Triphala and it's constituents showed the presence of flavonoids and alkaloids. Phytochemical analysis of Triphala powder revealed the presence of phenolics which is in accordance with the findings of Naik *et al.*, (2005), Amanullah *et al*., (2011) and Sharma *et al*., (2014). It has been well established that flavonoids in nature are potential antioxidants. Another class of natural products, alkaloids are complex heterocyclic nitrogenous compounds commonly found to possess antimicrobial properties. Saponins, which are amphipathic glycosides, maybe mono-or poly desmodic, depending on the number of attached

sugar moieties. Similarly, tannins are well-known for their antimicrobial and antioxidant activities. According to some reports, certain tannins are considered to be potential cytotoxic and antineoplastic agents.

This study on Triphala and it's constituents prove to be quite interesting due to the presence of all the above mentioned important classes of bioactive phytochemicals in the plant. Further, it provides scientific validation for usage of the plant extracts in folk medicine in our region. The present work on preliminary phytochemical screening of Triphala extracts certainly encourages future advanced research activities on chromatographic isolation of these compounds in its pure state.

CONCLUSION

Medicinal plants were the potent source of human health due to the presence of active phytochemical components that are responsible for its various pharmacological activities. The rapid increase in utilization of herbal remedies world wide has been inspired by several factors, including the concept that herbal products are safe and effective and so investigation on medicinal plants is increasing day by day. Triphala is known as the mother of medicine as it has a biodiversity of both nutritional as well as medicinal components. It is suggested that any herb or plant ingredients taken must be tested before being used as a remedy. On the basis of the results obtained, the present work concludes that the test extracts of Triphala powder are rich in phytochemical constituents. The results suggest that Triphala is a rich source of valuable primary and secondary metabolites which make "Triphala" one of the most valuable herbal proportions in the world. Hopefully, this review will encourage more awareness towards research and more confidence towards utilization of herbal medicines. It will be a link between science and man.

Triphala is known to possess different variety of phytosignatures drawn from the mixture of seeds of three plants. Antioxidants are important, as they are free radical neutralizers. The studies are of great significance as the demand for herbal products as natural antioxidants and antimicrobial agents is increasing constantly. This ancient ayurvedic drug showed manifold scientific evidences of its therapeutic properties. The various assays revealed the presence of

various phytochemical constituents which could be significantly important for its medicinal properties such as antibacterial, antifungal, antioxidant and anti-inflammatory.

The herbal medicines have shown potential to overcome the limitation associated with conventional drugs. Modern researches for bioactive molecules typically make use of sophisticated bioassays and bioassay-guided fractionation of medicinal plants used by traditional healers. This has led to the isolation of several new therapeutically important compounds. A good number of potent drugs and a large number of therapeutic leads and many new pharmacologically active constituents have been developed from herbal drugs due to the dedicated efforts of researchers. Medicinal plants are resources of new drugs and many of the modern medicines are produced indirectly from plants.

In the recent past, there has been growing interest in exploiting the biological activities of different ayurvedic medicinal herbs, owing to their natural origin, cost effectiveness and lesser side effects. Triphala is one of the ayurvedic medicinal herbal formulations prescribed by most health care practitioners. This information obtained will be helpful as a primary platform for further phytochemical and pharmacological studies.

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