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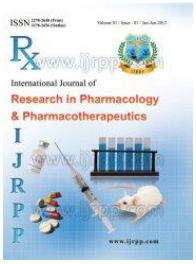

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"Triphala an innovative medicine of the centuries"

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ABSTRACT

TRIPHALA had been described from the Era of Charak and Sushruta as a medicine with multiple properties. The drug Triphala is a combination of fruits of Terminalia chebula Retz, Terminalia bellirica Roxb and Emblica officinalis Gaertn in equal amounts in fine powder form. Constituents are one fruit of Terminalia chebula, two fruits of Terminalia bellirica and four fruits Emblica officinalis are used for the preparation of medicine, It shows all three properties of Vatta, Pitta and Khapha .Triphala is considered a 'Tridoshic Rasayan' .With multiple properties such as Antioxidant, Antiinflammatory, Antihperlipidemic, Antianalgesic, Antimutagenic (Prevents spindle cell formation), Immunomodulatory, Radioprotective, Wound healing, Hepatoprotective, Antibacterial, Antitumor, Antiproliferative. Terminalia Chebula a content of Triphala contains gallic acid, chebulinic acid which inhibits the growth of human cancer cell lines. Selenium present in Triphala as Glutathione peroxidase inhibits the replication of tumor virus and prevents malignant transformation of cells. Triphala promotes Appetite, increases Red blood cells, Haemoglobin. It is a tonic cleanser and Blood purifier and rich in Magnesium, Calcium, Selenium, Potassium, Iron and Zinc. Always a precancerous condition and its progression must be checked before the patient goes into the agony of cancer. Ayurvedic treatments, use of TRIPHALA could be an effective remedy "TRIPHALA" –AN INNOVATIVE MEDICINE OF THE CENTURY

INTRODUCTION

Triphala is a well known polyherbal formulation from Ayurveda. It is a Rasayana Drug used in Indian System of Medicine (ISM) [1]. Triphala is a mixture of three fruits which is composed of dried fruits of Emblica officinalis Gaertn (Euphorbiaceae), Terminalia belerica Linn (Combertaceae) and Terminalia chebula (Combertaceae) in equal proportions (1:1:1) as described in Ayurvedic Formulary of India [2] . In Ayurveds Triphala termed as tridoshic rasayana and to have balancing and rejuvenating effects on the three constitutional elements that govern human life (Vata, Pitta and Kapha). It is used as colon tonic, laxative, eye rejuvenator, anti-inflammatory, antiviral etc [3]. It is also used as a blood purifier that can improve mental faculties and posseses anti-inflammatory, analgesic,

anti-arthritic hypoglycemic and anti-aging properties. Triphala is claimed to have antiviral and antibacterial effects [12]. Triphala inhibits the growth of Gram positive and Gram negative bacteria [15]. Triphala is rich in gallic acid, vitamin C, ellagic acid, chebulic acid, bellericanin and β-sitosterol.

CONSTITUENTS OF TRIPHALA (TABLE.NO.1)

	VIBHATKI	AMLAKI	HARITAKI
LATIN NAME	Terminalis bellerica	Emblica officinalis	Terminalis chebulalinn
FAMILY	Combretaceae	Euphorobiaceae	Combretaceae
ENGLISH NAME	Belleric myrobalan	Amlaki	Chebulic murobalan
CHEMICAL COMPOSITION	Tanin, tannic acid and resin.	Vit C , Phosphatides and an essential oil rich in tanins.	Chebulic acid, gallic acid and some purgative of nature of anthraquinone

PROPERTIES OF TRIPHALA USED IN DENTISTRY

Antioxidant property

The presence of flavonoids, tannins and glycosides in triphala reduce the oxidative stress by converting reactive oxygen free radicals to non-reactive products [1,2,7]

Antimutagenic property

A significant inhibition of 98.7% was observed with acetone extract against the revertants against direct acting mutagens, 4- nitro phenylenediamine and sodium azide, and the indirect acting promutagen, 2-aminofluorene[5].Triphala is effective in inhibiting ϒ-radiation induced damage in microsomal lipids and plasmid pBR 322 DNA. Triphala is rich in polyphenols (38±3%) and tannins (35±3%). Polyphenolic contents in triphala are responsible for the antioxidant and radioprotecting ability; reduce the oxidative stress by converting reactive oxygen free radicals to non-reactive products [6]. Superoxide radical scavenging activity of triphala using xanthine and xanthine oxidase activity showed that in addition to reacting with superoxide radical, triphala also inhibit uric acid formation. Triphala is rich in phenols/polyphenols (38±3%), tannins (35±3%) but flavonoids were absent and gallic acid content was 73±5 mg/g and increased to 150±5mg/g upon acid hydrolysis [14].

Antitumor property

With induction of apoptosis, and with reactive oxygen species generation and with phosphorylation of p53 [6]. The cytotoxic effects of aqueous extract of Triphala, an ayurvedic formulation were investigated on human breast cancer cell line (MCF-7) and a transplantable mouse thymic lymphoma (barcl-95). The viability of treated cells was found to decrease with the increasing concentrations of Triphala. On the other hand, treatment of normal breast epithelial cells, MCF-10 F, human peripheral blood mononuclear cells, mouse liver and spleen cells with similar concentrations of triphala did not affect their cytotoxicity significantly. The drug treatment was found to induce apoptosis in MCF-7 and barcl-95 cells in vitro as determined by annexin-V fluorescence and proportion of apoptotic cells was found dependent on triphala concentration. MCF-7 cells treated with triphala when subjected to single cell gel electrophoresis, revealed a pattern of DNA damage, which is characteristic of apoptosis. Studies on Triphala treated MCF- 7 and barcl-95 cells showed significant increase in intracellular reactive oxygen species (ROS) in a concentration dependent manner. ROS increase was however, found to be not significant in MCF-10 F as well as in murine spleen and liver normal cells. In vivo, direct oral feeding of Triphala to mice (40 mg/kg body weight) transplanted with barcl-95 produced significant reduction in tumor growth as evaluated by tumor volume measurement. It was also found that apoptosis was significantly higher in the excised tumor tissue of triphala fed mice as compared to the control, suggesting the involvement of apoptosis in tumor growth reduction. These results suggested that triphala possess ability to induce cytotoxicity in tumor cells but spared the normal cells. The

differential effect of triphala on normal and tumor cells seems to be related to its ability to evoke differential response in intracellular ROS generation. The differential response of normal and tumor cells to triphala in vitro and the substantial regression of transplanted tumor in mice fed with triphala points its potential use as an anticancer drug for clinical treatment [15].

Immunomodulatory property

Flavonoids, alkaloids, tannins, saponin glycosides and phenolic compounds showed various neutrophil functions like adherence, phagocytosis and nitro blue tetrazolium reduction with significant decrease in corticosterone level [1]. Triphala has an immunomodulatory activity when tested using carbon clearance test and Delayed Type Hypersensitivity (DTH) [Foot Pad Swelling] response. Triphala Mega extract when administered at 500 mg/Kg and 1000 mg/Kg orally showed an increase in carbon clearance index which reflects enhancement of phagocytic function of mononuclear macrophage and nonspecific immunity. There was an increase in DTH response or cell medicated immunity. Triphala mega extract had an stimulatory effect on T-cells. The good immunomodulatory property of triphala could be attributed to flavonoids, alkaloids, tannins, saponin glycosides and phenolic compounds[10,12.] Oral administration of triphala stimulates neutrophil functions in immunized rats and stress induced suppression in neutrophil function were prevented by triphala [13].

Hypolipidemic property

The efficacy of Triphala on total cholesterol, low density lipoprotein, very low density lipoprotein, High density lipoprotein and free fatty acid levels were significantly reduced in hypercholesteremic patients [13].

Anticancer property

Beta-sistosterol, gallic acid, ethyl gallate, galloyl glucose, chebulagic acid, ellagic acid, phenolic compound are known to inhibit carcinogen-induced cancer through apoptosis [12].A group of researchers have reported the inhibitory action on cancer cell growth by the phenols of T. chebula Retz fruit and found that chebulinic acid, tannic acid and ellagic acid. Ethanol extract of T. chebula fruit inhibited cell proliferation and induced cell death in a dose dependent manner in several malignant cell lines including human (MCF-7) and mouse (S115) breast cancer cell line, human osteosarcoma cell line (HOS-1), human prostate cancer cell (PC-3) and a non-tumorigenic immortalized human prostate cell line (PNT1A). Besides, acetone extract of bark and fruit powder of T. chebula harbors constituents with promising anticarcinogenic activity. [15]

Hepatoprotective property

Gallic acid is a phytoconstituent possess hepato-protective property. Aqueous extract of Triphala decreases serum AST (Alanine serum transaminase), ALP (Alkaline phosphatase) and liver LPO by regulating the MDA (monodialdehyde) level and antioxidant enzymes inhibits LPO (lipid peroxidation) and prevents oxidative stress. As iron is an essential element in the body, iron overloaded situation is coupled with the oxidative stress. These induces health problems like anemia, heart failure, liver cirrhosis, fibrosis, gallbladder disorders, diabetes, arthritis, depression, impotence, infertility and cancer[11]. Hepatic injury by iron results in the leakage of cellular enzymes into the bloodstream, resulting in augmented levels of serum ALT, AST, ALP and bilirubin. Overloaded iron causes significant increase of hydroxyproline, a marker biomolecule of liver fibrosis. The phytochemical analysis shows that T. chebula is a rich source of various phenolic and flavonoid compounds which are well known for their free radical scavenging and iron chelating properties [11, 13]

Alcoholic liver disease is a major cause of morbidity and mortality worldwide. Chronic consumption of ethanol is the major cause of liver injury and the development of serious liver diseases [2, 4]. Ethanol- induced liver disease is linked with an increase in oxidative stress. Acute and chronic ethanol treatment increases the production of reactive oxygen species (ROS), lowers cellular antioxidant levels and enhances oxidative stress in many tissues; especially the liver. Oxidative stress induced by ethanol is known to play an important role in the pathogenesis of liver injury. Triphala have demonstrated free radical scavenging and/or antioxidative potential due to the flavonoids and other polyphenolic compounds they contain [2].

Antifungal property

T. chebula exhibited antifungal activity against a number of dermatophytes and yeasts [10]. It is effective against the pathogenic yeast Candida

albicans and dermatophytes Epidermophyton, Floccosum, Microsporum gypseum and Trichophyton rubrum. An aqueous extract of T. chebula showed inhibitory effects on three dermatophytes (Trichophyton spp.) and three yeasts (Candida spp.). In vitro anticandidal activity of methanol extract of T. chebula was observed against clotrimazole resistant Candida albicans. Seed extract Shows anticandidial activity due to presence of gallic acid, ethyl acetic acid present in Terminalis chebula in candida associated denture-stomatitis [14]

Antiinflammatory

Triphala when topically administered prevents uveitis induced by intravenous injection of lipopolysaccharide from Escherichia-coli. The inflammation of anterior segment in control groups was significantly higher than in triphala treated groups. Triphala exhibits a protective effect in endotoxin-induced uveitis. The treated groups showed not only significant reduction in severity of clinical signs and also reduction in levels of inflammatory cell, protein content and TNF-α compared with that of the control group [3].

Radioprotective property

Oral administration of emilica officinalis has shown good effects on prevention of chemotherapy and radiotherapy. Decrease in superoxide dismutase activity exposed to whole body ϒ irradiation and by decreasing lipid peroxidation activity of lactate dehydrogenase and increase in level of reduced glutathione prevents oxidative damage [6, 8].

Anticaries property

The aqueous extract of T. chebula strongly inhibited the growth, sucrose induced adherence and glucan induced aggregation of Streptococcus mutans. Mouth rinsing with a 10% solution of the T.Chebula extract inhibited the salivary bacterial count and glycolysis of salivary bacteria for upto 90 min post rinsing [12,15]

Wound healing property

Triphala extract ointment (10%) was assessed for in vivo wound healing on infected rat model by rate of healing, bacterial count,biochemical analysis and expression of matrix-metalloproteinase. Topical application of triphala ointment on infected wound not only reduces the risk of infection but also improved the healing. [12] Epigallocatechin gallate interaction with collagene expression and extracellular signal regulated kinase contributes to quick wound healing activity [11]. The ointments prepared from triphala extracts show significant wound closure in vivo. The granulation tissue shows reduced bacterial count, increase in collagen, hexosamine uronic acid. Collagen sponges incorporated with triphala, when used to close wounds showed increase thermal stability, water uptake capability, faster wound closure with improved tissue regeneration. [3,4.5].

Antimicrobial property

Triphala controls dental plaque, gingival inflammation and microbial growth caused by Streptococcus mutans and Lactobacillus. Triphala controls plaque from baseline and its activity is comparable to commonly available mouthwash Chlorhexidine. Ayurvedic formulations like Triphala Mashi exhibit antimicrobial activity attributed to phenolic compounds and tannins in triphala [3].Triphala inhibits dose- dependent growth of gram positive and gram negative bacteria and its individual fruit components have a potent antibacterial action against a wide spectrum of bacterial isolates like pseudomonas aeruginosa, Klebsiella pneumonia, Shigella sonnei, Staphylococcus aureus, vibrio cholera, isolated from HIV infected patients. These showed antibacterial effect on both gram positive and gram-negative bacteria, which suggests the ingress of active phytochemicals through both the bacterial cells walls. Triphala churna has antibacterial activity against various bacterial pathogens. Aqueous extract has activity against S.epidermidis, S.aureus, P.vulgaris, mildly antibacterial against S.typhimurium, B.subtilis and negligible and no inhibitory effect against E.coli and E.aerogens. and no antibacterial activity against E.coli, E.aerogenes and P.aeruginosa [3, 8].

Root canal irrigant

Presence of tannic acid in Terminalis chebula ,Terminalis belerica with a combination of property of anti-oxidant and anti-inflammmatory is used as a Root canal irrigant [15]

FIGURE NO.1: Triphala constituents and prevention of malignant transformation of cells.

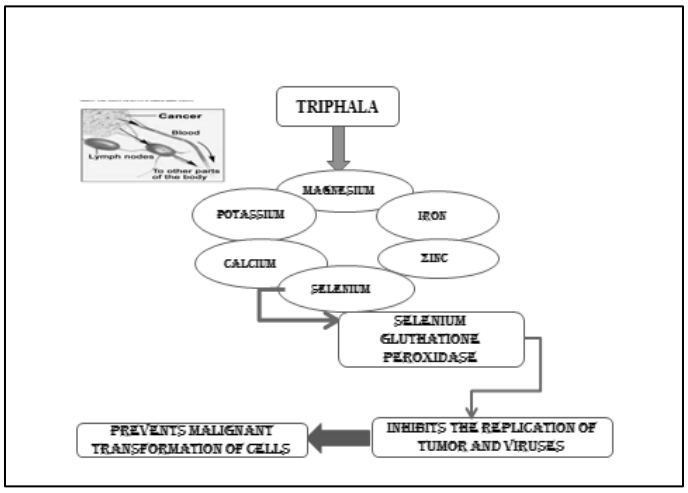


FIGURE NO .2: Triphala in mucocutaneous lesions.

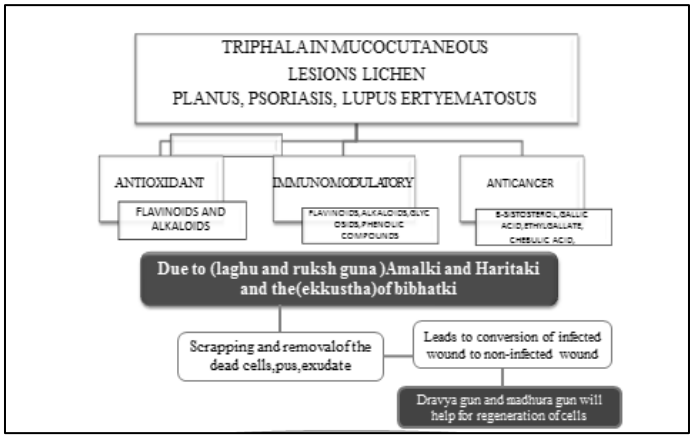
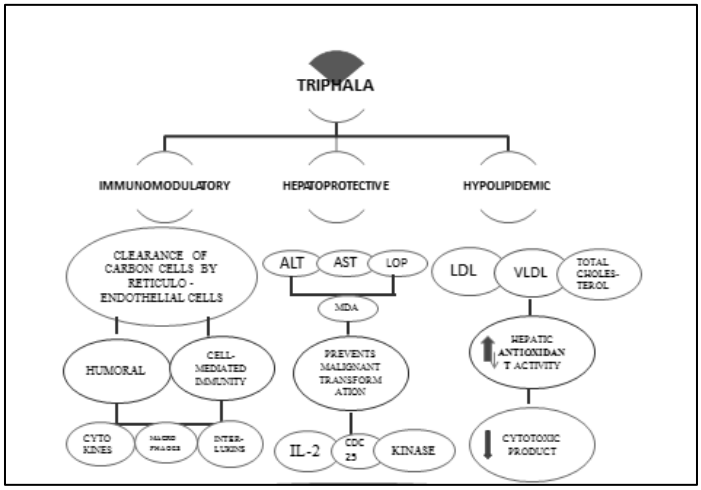


FIGURE NO.3: Properties of triphala : Immunomodulatory,Hepatoprotective and Hypolipidemic.



CONCLUSION

Triphala a king of medicine according to Charaka Samhita is termed as tridoshic rasayana and have balancing and rejuvenating effects on the three constitutional elements that govern human life Vata, Pitta and Khufa. Triphala is an effective for curing a wide range of ailments, prevention of premalignant lesions to malignant lesions and with no adverse effects.

As dentist deals with Oral Precancerous and Cancerous lesions and other mucosal lesions in routine practise.Triphala can be used to prevent Side effects of the steroids and can also be used as an alternate medicinal and adjuvant treatment modality as it targets both Cellular and Humoral Immunity.

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