



Hepatoprotective Action of Terminalia Chebula, Terminalia Billerica, and Emblica Officinalis (Triphala): A Review

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ABSTRACT

Liver afflictions are an important global well-being burden, making the study of everyday remedies such as Terminalia chebula, Terminalia bellerica, and Emblica officinalis (Triphala) important for their hepatoprotective effects. Terminalia chebula, Terminalia Billerica, and Emblica officinalis are famous for their different bioactive compounds, containing polyphenols, flavonoids, tannins, and vitamins, which award antioxidant, antagonistic-investigative, and hepatoprotective characteristics. Several in vitro and in vivo studies have manifested the capability. Triphala, an established Ayurvedic formulation including equal parts of Terminalia chebula, Terminalia bellerica, and Emblica officinalis, exhibits cooperative hepatoprotective belongings distinguished from individual components that are necessary for the complete conduct of allure constituents. Clinical studies judging Triphala have stated promising results in improving liver function stones and reducing manifestations of liver ailments. In conclusion, Terminalia chebula, Terminalia bellerica, and Emblica officinalis, both separately and as Triphala, hold huge potential as open hepatoprotective powers. Further research, including dispassionate problems and mechanistic studies, is authorized to obtain across their efficacy, safety, and latent microscopic mechanisms, concreting the habit for their unification into prevailing medicine for liver health management and affliction administration

INTRODUCTION

The liver is one of the extensively explored areas in Modern Medicine. Among the various diseases affecting it, Hepatitis-B virus infection is a very important one because of its potential to cause life-threatening complications like cirrhosis, ascites, and hepatocellular carcinoma. More than 400 million people worldwide are chronically infected by the hepatitis B virus (HBV) (WM Lee, 1997)¹. 82 percent of the world's 530000 cases of liver cancer per year are caused by viral hepatitis infection, with 316000 cases associated with hepatitis Band 118000 with hepatitis C (WHO, World Health Report 1996).^{2} It is the 10th leading cause of mortality. Western Medicine, despite its enormous success, does not offer any promising cures and the role of traditional systems of medicine cannot be overlooked.

Evaluation of a jaundice patient is one of the frequent challenges encountered by a physician in general practice and one of them is acute viral hepatitis. Hepatitis B virus is an important cause of acute viral hepatitis. The Hepatitis B virus is a DNA virus with a unique enzyme i.e. the DNA Polymerase that can synthesize DNA by reverse transcription. The clinical features produced by the HBV virus may range on one hand from asymptomatic to fulminating fatal infection on the other hand subclinical persistent infection to rapidly progressive chronic liver disease with cirrhosis and hepatocellular carcinoma (Harrison Principles of Internal Medicine). Triphala, polyherbal formulations containing Haritaki (*Terminalia chebula*), Vibhitaki (*Terminalia bellerica*), and Amalaki (*Emblca officinalis*) have been tried both experimentally as well as clinically in the cases of hepatitis B.

LITERATURE REVIEW

A total of 44 cases from the O.P.D. and I.P.D. of Kayachikitsa, B.H.U, Varanasi, were registered for this study, out of which 38 cases completed the trial.

a. Inclusion Criteria

1. Age between 20-50 years of either sex
2. Symptoms and signs of acute viral hepatitis
3. Abnormal Liver Function Tests
4. Presence of HbsAg and other viral markers for HBV in blood

b. Exclusion Criteria

1. Chronic hepatitis (>6-month duration)
2. Viral markers of hepatitis 'B' negative
3. Other causes of viral hepatitis like HA V, HeV, HDV, and HEV.
4. Complications like obstructive jaundice, cirrhosis, fulminating hepatitis, liver failure, hepatocellular carcinoma, etc

c. Study Design

This was a double-blind, placebo-controlled study where the observer and subject were unaware of the study medication. The institution's Ethical Review Committee of B.H.U. approved the study. All patients underwent a complete general examination to rule out any gross abnormalities and were evaluated clinically and biochemically to confirm the diagnosis.

d. Grouping

Subjects were divided into groups as follows:

- i. Treated group: (n=30): received 80 ml of decoction (kwath) of Triphala orally in two divided doses along with honey.
- ii. (ii) Control group (n=8): received oral glucose and normal diet.

e. Selection and Preparation of Drug

The dried fruits of Terminalia chebula, Terminalia Billerica, and Emblica officinalis popularly called Triphala (three fruits), were selected for this study. The pulp of all three fruits was taken in equal proportion, mixed, and course granule was prepared. 5 grams of course granules of Triphala were boiled in 250 ml of water and allowed it to dry until it reached approximately 80 ml. The whole content was filtered and the prepared decoction was advised to take in two equal doses in a day.

Follow-up and Assessment

- (a) All subjects were evaluated weekly for the initial one month and thereafter once a month for up to 6 months. The efficacy of the trial drug was assessed by:

Relief in symptoms on a point rating score:

- 0- Free from symptoms
- 1- Mild and intermittent
- 2- Moderate and constant
- 3- Severe and progressive

- (b) Normalization of abnormal liver function tests and disappearance of Australian antibodies are from the blood. The biochemical tests were carried out at enrolment and thereafter weekly for 1 month and once a month up to 6 months. Hepatitis 'B' surface antigen was done at enrollment and the end of the 3rd and 6th months.

METHODS

Both the groups were compared by "Students unpaired 't' test". Changes in the various biochemical parameters were evaluated at the end of, 2nd, 3rd and 4th weeks and later assessed by the "students paired 't' test" for statistical significance.

Table 1. Statistical Analysis

Variable	Treated Group (n=30)		Control Group (n= 8)		Unpaired 't'
	BT Mean ± SD	AT Mean ± SD	BT Mean ± SD	AT Mean ± SD	
Sr. Bilirubin	17.03±3.82	1.64±0.82 P<. 001 HS	11.49±1.23	7.5±0.76 P< 0.01 S	15.52 P<.001
ALT	832.53±141.27	52.6±16.92 P<. 001HS	838.7±37.39	650.0±30.6 P<0.01S	22.4 P<0.001
AST	723.94±57.53	40.4±24.5 P<0.001 HS	562.0±34.8	380.12±30.86 P<0.01S	25.69 P<0.001
Alk. Phosphatase	648.8±60.13	120.5±26.52 P<. 001 HS	593.0±40.38	380.0±25.65 P<0.1S	16.94 P<0.001

RESULTS

In the considered group, the scores of manifestations like yellow sclera and excretion, eating disorders, sickness in the stomach, and fatigue were considerably decreased in the last period (80 per insignificant value). On the other hand, the control group revealed only moderate remedy 50 per insignificant value in gauntness and sickness in the stomach but only gentle remedy in syndromes like yellow discoloration of sclera and excretion. Moreover, a few of the sufferers enhanced friendship accompanying pain in the midriff and muscle spasm.

The bettering of manifestations was situated biochemical limits like level of total antitoxin bilirubin, ALT, AST, and alkaline phosphatase. The mean distinctiveness of bilirubin, ALT, AST, and ALP was expected to be statistically meaningful in the division into four equal parts effect of the acted group as distinguished from the control group.

A bury group comparison between doctored and control groups was statistically well, important in the unevenness principles for all duplicate limits. Among 30 cases of the doctored group, 26 enhanced negative for Australian irritant at the end of the 4th period, while in the control group (n = 8), 6 of the ruling class enhanced negatively when executed trial drug later, the accomplishment of the trial ended.

Experimental Study

The study was completed activity to judge the hepatoprotective endeavor and Antioxidant characteristics of Triphala.

Grouping of Animals

A total of 24 rats were contained in the study and were detached into 4 groups of 6 mammals in each group.

Group I

Contro I

Group II

Animals were taken 1.3ml/ g wt., of Triphala verbally for seven days.

Group III

Animals were likely 1 per insignificant value carboxymethylcellulose (CMC) in water purified by distillation for seven days, accompanying paracetamol at 2g/kg carcass wt. P.O. pensile in 1 per insignificant value CMC executed on the having five of something epoch (Asha and Pushpangadan, 1997). (Paracetamol discussed).

Group IV

Animals taken 1.3 ml/g wt. of Triphala verbally for seven days, accompanying paracetamol at 2g/kg material weight, verbally likely on the having five of something era (Triphala medicated)

At the end of the experiment (48 employment recruiting and management, following in position or time paracetamol presidency), under heavenly sleep, ancestry samples were calm in centrifuge tubes by way of cardiac puncture, and the antitoxin was divided. The belly was cut open and liver samples were detached. To avoid RBC adulteration, samples were cut into limited slices, rinsed utterly in frozen, salty water, and disfigured by accompanying blotting paper.

Serum samples were stopped soon in a deep icebox at 20 °C and something that incites activity assays was acted upon following a time.

The Enzyme assays were accomplished by accumulating the antitoxin samples and committing assay for hepatic tombstone enzymes specifically has Aspartate transaminase (AST) Alanine transaminase (ALT) and Alkaline phosphatase (ALP). Activities of AST and ALT were assayed by the 2-4 DNPH procedures. Values are articulated as IV/dl ALP exercise was calculated utilizing the plan of Kind and King (1954) and results are articulated as K.A. parts/L.

The histopathological test was approved by maintaining liver pieces in 10 per insignificant value chemical compound resolution and the implanting ruling class in paraffin fuller. Sections of about 4-611m thicknesses were captured and tainted accompanying hematoxylin eosin and illustrated.

The following tables show the effect of Triphala on antitoxin Liver Transaminases enzymes (AST, ALT, ALP) and MDA and SOD levels in paracetamol (peT) persuaded hepatotoxicity. Inter group contrasting was fashioned between Group I and Group II,

Group III and Group I (y), and Group IV and Group III (z)

All mathematical studies are accomplished by scholars single 't I te&t 'P' principles < 0.01 were thought-out expected statistically important.

Table 2. Result and Observations

Sl.No	Group	AST (IU/L) Mean±S.E	ALT (IU/L) Mean±S.E	ALP (IU/L) Mean±S.E	M.D.A Mean±S.E (nmol/ml serum)	S.O.D Mean±S.E (nmol/ml serum)
1.	Control	51.33±1.75	17.67±0.76	39.33±1.05	0.347±0.06	0.181±0.002
2.	Triphala Perse	51.50±0.96 ^(a)	19.50±0.67 ^(a)	38.50±1.34 ^(a)	0.374±0.006 ^(a)	0.171±0.005 ^(a)
3.	Paracetamol Treated	90.17±0.98 ^(b)	70.00±0.86 ^(b)	70.00±0.68 ^(b)	0.671±0.005 ^(b)	0.392±0.036 ^(b)
4.	Triphala Treated	72.83±1.33 ^(c)	50.50±0.89 ^(c)	40.67±0.88 ^(c)	0.539±0.042 ^(c)	0.145±0.004 ^(c)

The results are summarized in Tables 1 and 2 As compared to the control group, the animals in the paracetamol-treated group showed a significant increase in lipid peroxidation (LPO) as revealed by raised M.D.A and SOD activity with an equal increase in serum levels of hepatic marker enzymes. Prevention was significant in animals receiving Triphala and paracetamol. Animals given only Triphala did not show any alteration in LPO and SOD without any significant effect on other parameters.

DISCUSSION

Triphala is a polyherbal Ayurvedic formulation containing ingredients Haritaki (Terminalia chebula){6}, Amalaki (Emblca officinalish) (Jose, J. K. and Kuttan, R., 2000){7} and Vibhitaki (Terminalia bel/erica) (Pad am S.K. et al., 1995){8} Among them, Haritaki is a laxative (Tamhane, MD., et al.,997; Hamada, 5.1., et al., 1997){9,10} and a popular remedy for constipation. It also possesses cholagogues and cholaretic activities. Amalaki (Bhattacyarya, A., et al., 1999){11} is a well-known drug for its Antioxidant and hepatoprotective properties.

Amalaki and Haritaki have antioxidant, immunomodulatory, and membrane-stabilizing properties by increasing the levels of Glutathione and SOD enzymes are present in the hepatocytes (Rege, NN., et al., 1999; Vani T. et al. , 1997){12,13}

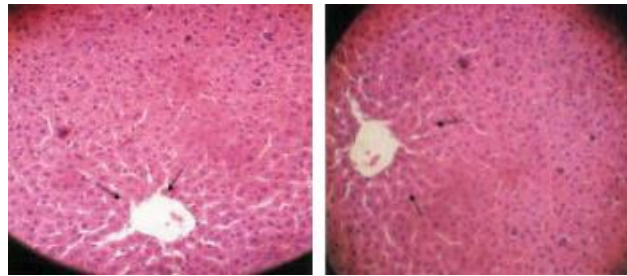


Figure 1. Histology of Liver-Control Group

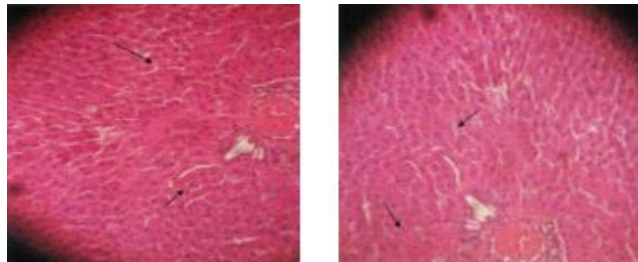


Figure 2. Histology of Liver-Triphala Group

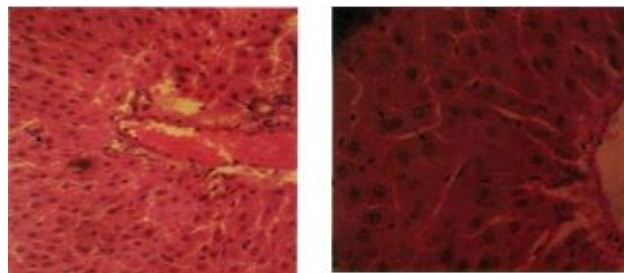


Figure 3. Histology of Liver-Paracetomal Group

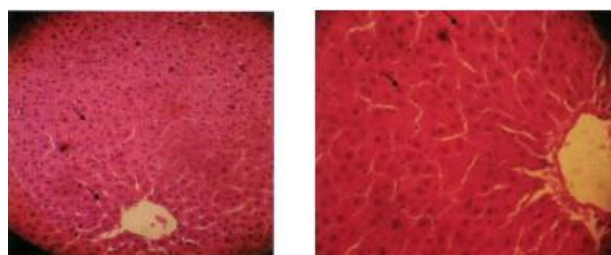


Figure 4. Histology of Liver-Pre Treatment with Triphala

CONCLUSIONS AND RECOMMENDATIONS

Terminalia chebula, *Terminalia bellerica*, and *Emblca officinalis*, both individually and as Triphala, demonstrate significant hepatoprotective potential. Their ability to mitigate liver injury, improve liver function markers, and alleviate symptoms of liver diseases highlights their promising role in liver health maintenance and disease management. Further research, including well-designed clinical trials and mechanistic studies, is warranted to validate their

efficacy, safety, and clinical utility, thereby facilitating their integration into mainstream medicine for liver-related disorders.

FURTHER STUDY

This research still has related limitations so it is necessary to carry out further research on the topic Hepatoprotective Action of Terminalia chebula, Terminalia Billerica, and Emblica officinalis (Triphala): A Review in order to perfect this research and increase insight for readers

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