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# EFFECT OF BHALLATAK MODAK IN CCL4 INDUCED ACUTEHEPATOTOXICITY IN RATS

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## ABSTRACT

**Background & objective -** While the effect of industrialization and commercialization are widely and rapidly spreading in the society, chances of contact with toxins are also increasing. In living system liver is considered to be highly sensitive to toxic agents. On previewing the role of liver in detoxification we can presume that antitoxic formulations must be acting on liver. The objective is to evaluate the efficacy of *Bhallatak Modak* in $CCl_4$ induced hepatotoxicity in rats. **Method -** In this experimental study in vitro study conducted for evaluating antitoxic activity of *Bhallatak Modak*. In in-vivo study evaluated hepato protective effect oftwo concentrations *Bhallatak Modak*, in $CCl_4$ induced hepatotoxicity and comparison with Liv 52. The hepatoprotective activity was evaluated by biochemical parameters - aspartate aminotransaminase (AST), alanine aminotransaminase (ALT), alkaline phosphatase (ALP), total protein, albumin, and by analysis of histopathology of the liver. **Result:** *Bhallatak Modak* has shown potential hepatoprotective activity against the $CCl_4$ induced liver damage in animal model.

**Key words:** Hepatotoxicity, *Bhallatak Modak*, $CCl_4$

## INTRODUCTION

*Ayurveda,* whose history goes back to 5000 BC., is one of the ancient health care systems. The *Ayurveda* was developed through daily life experiences with the mutual relationship between mankind and nature. The ancient text of *Ayurveda* reports more than 2000 plant species for their therapeutic potentials. Today the pharmacologically active ingredients of many *Aayurvedic* medicines are being identified and their usefulness in drug therapy being determined. Since time immemorial, mankind has made the use of plants in the treatment of various ailments.

Herbal drugs have gained importance and popularity in recent years because of their safety, efficacy and cost effectiveness. Several hundred plants have been examined for use in a wide variety of liver disorders. Just a handful has been fairly well researched. Despite the significant popularity of several herbal medicines in general, and for liver diseases in particular, they are still unacceptable treatment modalities for liver diseases. In recent years the usage of herbal drugs for the treatment of liver diseases has increased all over the world. There are about 600commercial herbal formulations, which are claimed to have hepatoprotective activity. Efficacy of the traditional and new herbal products should be tested by standard experimental methods. Also

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there should be adequate data from in vivo and in vitro studies to validate the therapeutic potential claimed.

Ayurveda upholds detoxification of the body systems as a main treatment methodology. *Agadtantra* is one the branch of *Astang Ayurveda*, often called as the Indian toxicology- recommends detoxification, i.e. removal of toxins; which if retained in the body could become detrimental for the bodily functions. In the world history itself we can find the superiority of treatments mentioned in Indian toxicology. In those days *Visha Cikitsaka* had wide responsibilities other than treating snake and insect bite but also to attend social problems like environmental pollution, food poisoning etc. Hence antitoxic drugs have a definite role in combating today's toxicities.

Today, there are so many patients seen with liver disorders. There is no such curative and complete treatment in modern medicine. Ayurveda has described various medicines in the management of *YakritVikar*. *Bhallatak Modak* is one of them. In Ayurveda, the *Yakrit* (liver) is the *mulsthane* of *rakthavahasrotas* and the seat of *Ranjaka pitta*. Any damage to the liver ultimately disturbs the digestion which is the main causative factor for all diseases. There are lots of drugs with hepatocurative activity described in classic Ayurvedic texts one of which is *Bhallatak Modak*, which may act well on Liver disorders caused due to different reasons.

**AIM AND OBJECTIVES**

- *Shodhan*of *Bhallatak*.
- To collect the literature on *Bhallatak Modak*, it's ingredients, preparation, dosage etc. according to Ayurvedic classics.
- Analysis of raw material and the final product.
- To study the efficacy of *Bhallatak Modak* in CCl4 induced hepatotoxicity in rats.

**Material and methods**

Raw drugs were collected from different sources in the S.G phytopharma Kolhapur. Three drugs were taken in same quantity i.e. 200 grams and the quantity of *Guda* (jaggery) was taken 1200 grams.

**SHODHAN OF BHALLATAK [1]**

300 gram of *BhallatakPhala* was taken and weighted it properly, immersed in water. After 15 minutes some *Bhallatak Phala* settle down at the bottom of the vessel while some may float on it.

Discarded the floated one and taken only the settled *Bhallatak*, dried properly in shadow.

After that Proximalend of the *Bhallatak* were removed in that added 1 kg *Ishtika Churna* and tied in a *Pottali*, done *Mardan* of *Pottali* and then the nuts are kept for a week embedded in brick powder, *Mardan* was done after every 2 days, and after a week

*Bhallatak* removed from the *Pottali* and washed with hot water. The *Bhallatak* obtained was *Shodit Bhallatak*.

**Raw Drugs [2]**

| Sl.no | Drug | Botanical name | Family | English name | Part used | Proportion |
|---|---|---|---|---|---|---|
| 1 | *Bhallatak* | Semicarpus anacardium. Linn | [Anacardiaceae]. | Marking nut | *Phala* | 200 grams |
| 2 | *Haritaki* | Terminalia chebula. Retz. | [Combretaceae]. | Chebulidmyrobalan. | *Phala* | 200 grams |
| 3 | *Jeeraka* | Cuminum cyminum. Linn. | [Umbeliferae]. | Cumin seed | *Beeja* | 200 grams |
| 4 | *Guda* | Jaggery. | Jaggery. | Jaggery. | | 1200 grams |

**Preparation *Bhallatak Modak*[3]**

1. All the raw drugs were ground into a *Churna* form with the help of grinder, for preparation of *Churna*, 80 number sieves was used.

2. As per the proportion indicated in the formulation 100gram of each drug were taken and mixed well.

3. Base drug - *Guda* 600 gram was heated with inadequate quantity of water in a vessel over mild fire.

4. After dissolution of *Guda* the blend may filtered once to get ride the physical impurities of *Guda.*

5. The filtrate is again boiled and reduced until 2 to 3 thread consistency is attained. Later the vessel is taken out of fire and fine powder of medicinal drugs was added little by little and stirred well to a homogenous mixture.

When *Paka* of suitable consistency was obtained the fine powder of all the drugs was added and stirred well to roll the *Modak* and was dried in shade. The prepared dry *Modak* of desire shape and sizes were stored in airtight containers.

**Trial drug**: *Bhallatak Modak*[4]

**Group A: Normal Control:**[5]

Three animals were taken in this group all the three animals weighing approximately 150-200grams.They all were maintained only on normal diet throughout the study.

**Group B: $CCl_4$ Control:**

Three animals were taken in this group all the three animals weighing approximately 150-200grams.Animals were given carbon tetrachloride orally with olive oil (1:1) from 2nd to 5th day without any drug treatment with a dose of 1mg/kg body weight

Along with $CCl_4$ they animals received normal diet throughout the study.

**Group C. standard Group:**

Three animals were taken in this group all the three animals weighing approximately 150-200grams. Animals were given Liv52 standard (1 ml/kg body weight, orally) for 1st to 5 days in a calculated dose and carbon tetrachloride orally with olive oil (1:1) from 2nd to 5th day.

They animal were received normal diet throughout the study.

**Group D. Trial Group:**

Three animals were taken in this group all the three animals weighing approximately 150-200grams.

Animals were given Bhallatak Modak in a calculated dose from day 1st to day 5 and carbon tetrachloride orally with olive oil (1:1) from 2nd to 5th day.

They animal were received normal diet throughout the study. The experimental animals were divided in four groups of 03 rats each.

**RESULT:**

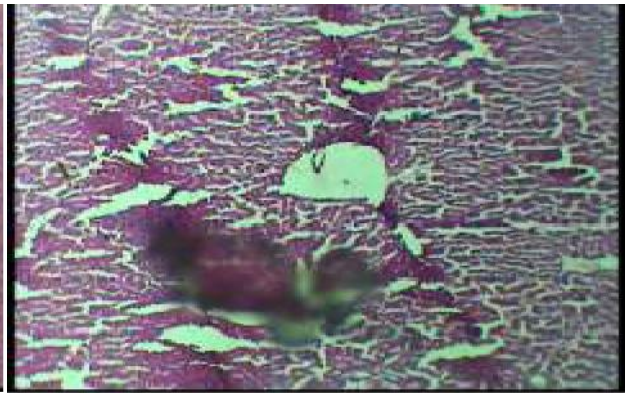
**Carbon tetrachloride induced hepatotoxicity**[6.7.8]

Administration of carbon tetrachloride caused a significant increase in serum enzymes, namely SGOT, SGPT, ALP and serum bilirubin in rats, as compared to normal rats. However, per treatment with the formulation, prior to carbon tetrachloride administration caused a significant reduction in the values of SGOT, SGPT, ALP and serum bilirubin. Which is almost comparable to the Liv52 treated groups

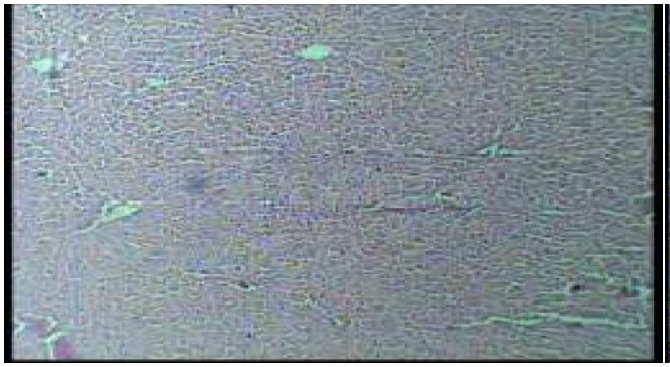
| Groups | Treatment | ALP(KA Units/) | SGOT (IU /l) | SGPT (IU/l) | SB (mg%) |
|---|---|---|---|---|---|
| **Normal Control** | Normal control | 10.20 ± 1.1 | 14.50 ± 1.2 | 33.5 ± 2.3 | 7.03 ± 0.17 |
| **$CCl_4$ Control:** | Carbon tetrachloride control (0.7 mL/kg) | 30.50 ± 2.3 | 42.35 ± 2.3 | 52.25 ± 1.3 | 3.82 ± 0.19 |
| **standard Group** | carbon tetrachloride (0.7 mL/kg)) + Liv52 (1 mL/kg) | 7.50 ± 1.3* | 8.62 ± 1.1* | 29.36 ± 2.3* | 6.68 ± 0.11* |
| **Trial Group:** | carbon tetrachloride (0.7 mL/kg)) + Formulation (750 mg/kg) | 9.02 ± 2.6* | 12.78 ± 1.1* | 34.3 ± 2.1* | 5.90 ± 0.21* |

**HISTOPATHOLOGICAL STUDIES:**

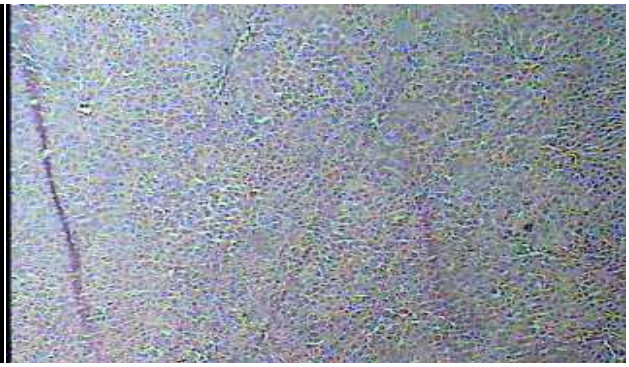
**Normal Control**



**carbon tetrachloride control**



**Standard (Liv52)**



**Formulation (48grams)**

The hepatoprotective effect of formulation was further confirmed by Histopathological examination of the liver samples from the respective groups

**1. Normal control:**

Microscopic section shows normal hepatic architecture

**2. Carbon tetrachloride control:**

The liver sections from the rats which received Carbon tetrachloride alone showed microscopically varying degrees of fatty changes and necrosis with congested vessels and sinusoids with loss of architecture in general.

**3. Carbon tetrachloride with Liv – 52 treated:**

The liver sections from the rats which received Carbon tetrachloride and formulation Liv – 52 showed microscopically cantered and sinusoidal changes with mild fatty change of hepatocytes.

**4. Carbon tetrachloride and formulation treated:**

The liver sections from the rats which received Carbon tetrachloride and formulation, showed microscopically moderate fatty changes with mild degeneration of hepatocytes with attempted regeneration and intra portal band formation.

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**STATISTICAL ANALYSIS:**[9]

All the values were expressed as Mean ± S.E. and data were analysed by applying ANOVA followed by Tukey-Kramer Multiple Comparisons Test at level of $p < 0.01$ were considered as significant.

*Bhallatak Modak* was found to be with significant hepatoprotective activity when given at concentrations of 40gram body weight. *Bhallatak Modak* treated group could significantly reduce the hepato toxicity ($p<0.001$) as seen by a decrease in hepatic enzymes such as in ALP, SGOT and SGPT. It would also decrease the serum bilirubin. Moreover *Bhallatak Modak*

Administration could significantly increase ($p<0.001$) the A/G ratio.

This was also supported by Histopathological analysis .This is in Agreement with the commonly accepted view that serum levels of AST, ALT and ALP return to normal with the healing of hepatic parenchyma and the regeneration of hepatocytes. *Bhallatak Modak* exhibits the excellent hepatoprotective properties as indicated by maximum prevention of increased serum biochemical parameters on $CCl_4$ induced toxicity.

## DISCUSSION [10.11]

*Bhallatak Modak* depicts strong hepato protection against $CCl_4$induced liver injuries in three consequent experimental studies. It brings significant reduction in liver enzymes towards normalcy. Similarly, it not only arrests necrosis and degeneration but also brings considerable re-generation of hepatocytes. *Bhallatak Modak* is prepared using parts of 3 herbs and *Guda*. Majority of the herbs have been studied individually for their medicinal values such as, *Haritaki* has shown choleretic hepatoprotective, and immune stimulant properties. *Bhallatak* is *Agnideepana* and *pachana* due to its *Katurasa* and *Ushna* and *Teekshna Gunas. Jiraka* is well known forits antioxidant, hepatoprotective, anti-inflammatory, and antim-icrobial properties, in addition it is also used in and gastrointestinal disorders. It has also been reported to be useful in jaundice and as a hepatoprotective agent. Many studies so far have been conducted on establishing the efficacy of individual medicinal plants and their properties. In brief,3 herbs used in *Bhallatak Modak* have hepatoprotective, ant fibrotic, improves liver cholagogue, anti-spasmodic, anti-pyretic, *Guda* is a major constituent of *Bhallatak Modak*. It is a powerful haematinic and is valuable in the treatment of haemolytic jaundice and micro lytic anaemia. The main focus of action of *Bhallatak Modak* in body is liver. It is useful in the treatment of *Pleeha Vriddhi* (Spleen enlargement); *Yakritvriddhi* (Liver enlargement); *Kamala*,(Jaundice); *Shotha* (Oedema); *Ayurvedic* Pharmacopoeias is full of compound formulations which are largely used by Ayurvedic physicians for centuries in their respective clinical practice. *Bhallatak Modak* is modified and standardized form of a classical Ayurvedic formulation. Therefore, the first study was designed to revalidate the stated efficacy of *Bhallatak Modak* in liver disorders by studying its effect against $CCl_4$ induced liver damage in animal model. This study showed cent present regeneration of hepatocytesin *Bhallatak Modak* treated animals after $CCl_4$ challenge. *Bhallatak Modak* has emerged as potent hepato protective and anti-inflammatory Ayurvedic formulation. A vast literature is available regarding the substances of plant, mineral and animal origin used in the preparations of Ayurvedic formulations. Ayurvedic pharmacopeia also carries description of numerous Ayurvedic formulations and its uses on human beings. And this practice started centuries back and still continues.

The drug *Bhallatak modak* contains *Bhallatak, Haritaki, Jiraka, and Guda* collectively acts as *tridoshahara, specially kaphahara.*

**According to *Rasas* Property We Can Consider the Action as Follows:**

The drug *Bhallatak* contains *Katu, Tikta, kashaya rasa*. *Bhallatak* contains *ushna* and *tikshan* property because of those properties it is *kaphvat shamak* and *pit vardik.*

It causes *agnideepana and pachana* due to its *katurasa and ushna and teekshnagunas.*

*It should be used as agnideepana in Kaphaja agnimandya.*

*In Grahani, arsha, ajeerna, atisara, udara, gulma and krimis which are all caused by agnimandya*. *Bhedana* action of *Bhallataka* helps to overcome *vibandha, anaha, gulma, udara* and to reduce the size of *yakrit* and *pleeha* whenever there is their enlargement. It eliminates *doshea* accumulated in *the pakvashaya*.

## CONCLUSIONS

*Bhallatak Modak* is a herbal preparation containing only 3 herbs and a *Guda*. *Bhallatak Modak* has shown potential hepatoprotective activity against the $CCl_4$ induced liver damage in animal model. The observed effect of *Bhallatak Modak* could be because of the synergistic effect of the various herbs used along with *Guda*. None of these herbs are present in the market. Liv -52 formulation as well as other popular marketed liver tonics like, Livergen, etc. The hepatoprotective activity of this simple formulation was found to be as effective as Liv – 52, in fact the activity on decreasing the serum bilirubin level was much higher when compared to Liv – 52. This indicates that this formulation can be more useful in treatment of Jaundice. Also being a simple formulation of easily available ingredients, the formulation definitely is cost effective and can be popularized for treatment of liver disorders. Further studies on adaptogenic characters will be useful to assess the potential of this formulation.

## REFERENCES


1. Rastarangini By Shri Sadanand Sharma Chaukhambha varanasi.
2. DravyagunaVighyan, 17th Edition. By Aacharya Priyavat-Sharama. Chaukhambha Bharti Academy, Varanasi, 1995.
3. SharangdharSamhita: Sharangadhar, Hindi Comm. By Dr Shailaja Shrivastav. Publisher – Chaukhambha prakashan,Varanasi, reprint 2009.
4. Bhaishjya-Ratnawli By Vd. Goinddas Shastri-Chaukhamba Sanskrit Sansthan Varanasi 6th Edition 2010
5. Singh R, Singh H R. Hepatoprotective effect of pulp/ seed of Aeglemameloscorrea ex Roxb against CCL4 induced liverdamage in rats, International Journal Of Green Pharmacy2008; 9:(7):232-234.
6. Principles of Anatomy & physiology Gerard Tortora, Sandra Grabwski Harper, Collins, Collage publishers. 1993
7. Sabina E.P.et al, Hepatoprotective and antioxidant potential of Spirulinafusiformis on acetaminophen induced hepatotoxicityin mice, IJIB, 2009: Vol. 6 p.1-5.
8. Anand KK et Al. Hepatoprotective study of a fraction from thefruits of Terminalia belericaRoxb. On experimental liverinjury in rodents Phytotherapy Res 1994;8(5):287-292
9. Methods in Bio-Statistics, by B.K. Maha-jan. – 7th Edition,
10. Bhavprakash Nighantu: Bhavmishra, Vidyotini Hindi Comm. By. Brahmashankar Mishra Shastri, 7th Edition Chaukhamb-han Sanskrit Sansthan, Varanasi.
11. API Textbook of Medicine: by Sid-harth N.Shah, 7th edition.


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