OPEN ACCESS
Scholars International Journal of Traditional and Complementary Medicine
Abbreviated Key Title: Sch Int J Tradit Complement Med
ISSN 2616-8634 (Print) |ISSN 2617-3891 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Review Article

Prataha-Kalik Yoga W.S.R to Hepatoprotective Activity-Literary Review

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DOI: 10.36348/sijtcm.2023.v06i07.001 | **Received:** 06.06.2023 | **Accepted:** 18.07.2023 | **Published:** 05.08.2023

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Abstract

The recent changes in our dietary habits & lifestyle have welcomed a huge number of metabolic diseases. Most common being the fatty liver and the liver cirrhosis. People who are obese or consume alcohol on the daily basis are more prone to hepatic diseases. But there is a change in the trend, Non-alcoholic fatty liver disease has come into limelight due to our changes in dietary habits and the unseen toxicity that our liver is exposed on daily basis. *Prataha-Kalik Yoga* mentioned in the *Pandu Roga* by Acharya's can be effective as a therapeutic option for liver. After analysis of its *Rasapanchak*, with the dominance of *Tikta* and *Kashya Rasa* it seems to be a promising *Y*oga. A review study has been done to know the hepatoprotective activity of *Prataha-Kalik Yoga.*

Keywords: *Prataha-Kalik Yoga*, Hepatoprotective, Liver disease.

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INTRODUCTION

The population of India is already under the influence of lifestyle disorders such as diabetes mellitus, hypertension, obesity. There seems to be a new addition to this groups of lifestyle disorders i.e. the liver diseases. The cultural lifestyle transition that India is passing through currently with the progressive adoption of their dietary habits has introduced the liver diseases among the population [1]. Liver diseases are rapidly being recognized as public health priorities in India. On an average, at least 2.5 lakh -3 lakh people get affected by liver diseases in 2021 [2]. The liver has many important functions, including digestion of food, its processing and distributing nutrients. It plays an important role in the metabolism of carbohydrate, protein & fats. It is also a storage site of vitamins, ferritin. It is involved in the formation of the factor used in the blood coagulation process. Liver is well known for its ability to detoxify or excrete many drugs including sulphonamide's, penicillin, ampicillin, and erythromycin into bile. In a similar manner, several of the hormones secreted by the endocrine glands are either chemically altered or excreted by the liver, including thyroxine and essentially all the steroid hormones, such as oestrogen, cortisol and aldosterone. Liver damage can lead to excess accumulation of one or more of these hormones in the body fluids and therefore causes overactivity of the hormonal systems [3].

Drug review

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Acharya Charaka has described *Prataha- Kalik Yoga* under *Pandu Roga Chikitsa*. *Prataha-Kalik Yoga* contains *Triphala (Haritaki, Vibhitaki, Aamlaki)* or *Guduchi* or *Daruharidra* or *Nimba Swarasa*. Their *Swarasa* is to be consumed with *Madhu* during early morning in the treatment of '*Kamla*' [4], therefore mentioned as *Prataha-Kalik Yoga*. *Kamla* is also associated with the pathophysiology of liver. This *Yoga* is also mentioned in Ashtang Hridaya and Chakradutta under *Pandu Roga*. The contents of the *Prataha-Kalik Yoga* like *Triphala* or *Guduchi* or *Daruharidra* or *Nimba* possess various pharmacological and therapeutic properties as single drugs.

Table 1: Ingredients of *Prataha-Kalik Yoga*

S.No	Drug Name	*Rasa*	*Guna*	*Virya*	*Vipaka*	*Karma*
1.	***Haritaki* (*Terminalia chebula* Retz.)** [5]	*Panchras, Kashaya Pradhan*	*Laghu, Ruksha, Sara*	*Ushna*	*Madhura*	*Yakritotejak, Shothhar*
2.	***Vibhitaki* (*Terminalia bellerica* Roxb.)** [6]	*Kashaya*	*Ruksha, Laghu*	*Ushna*	*Madhura*	*Shothhar*
3.	***Aamlaki* (*Emblica officinale* Gaertn.)** [7]	*Panchras, Amla Pradhan*	*Laghu, Ruksha, Sheeta*	*Sheeta*	*Madhura*	*Yakritotejak, Shodintstapan*
4.	***Daruharidra* (*Berberis aristata* DC)** [8]	*Tikta, Kashaya*	*Laghu, Ruksha*	*Ushna*	*Katu*	*Yakritotejak, Shothhar, Kamlahar, Yakritvikarhar*
5.	***Guduchi* (*Tinospora Cordifolia* Willd)** [9]	*Tikta, Kashaya*	*Laghu, snigdha*	*Ushna*	*Madhura*	*Yakritvikarha, Kamlahar*
6.	***Nimba* (*Azadirachta indica* A)** [10]	*Tikta, Kashaya*	*Laghu*	*Sheeta*	*Katu*	*Yakritotejak*

Table 2: Ingredients of *Prataha-Kalik Yoga* in various Nighantus

Nighantu	*Haritaki*	*Vibhitaki*	*Aamlaki*	*Daruharidra*	*Guduchi*	*Nimba*
Bhavprakash Nighhantu [11]	*Haritkyadi Varga*	*Haritkyadi Varga*	*Haritkyadi Varga*	*Haritkyadi Varga*	*Guduchyadi Varga*	*Guduchyadi Varga*
Rajdev Nighantu [12]	*Pippalyadi Varga*	*Pippalyadi Varga*	*Pippalyadi Varga*	*Pippalyadi Varga*	*Guduchyadi Varga*	*Prabhadradi Varga*
Dhanvantri Nighantu [13]	*Guduchyadi Varga*	*Guduchyadi Varga*	*Guduchyadi Varga*	*Guduchyadi Varga*	*Guduchyadi Varga*	*Guduchyadi Varga*

***Haritaki* (*Terminalia Chebula*)**

Terminalia chebula (Family-Leguminosae) is a medium to large deciduous tree growing to 30 m tall in sub Himalayan region of altitude 1500 m. Commonly known as *Harad* [14].

Ayurvedic Pharmacological Properties of *Terminalia chebula*

The drug is *Panchrasa* mainly *Kashaya* (astringent), *Laghu*, *Ruksha* and *Sara* in *Guna*, *Ushna* in *Virya* (potency), and *Madhura* (sweet) in *Vipaka* and pacify *Tridosha* [5].

Chemical Constituents

Haritaki fruit is very rich in tannins amounting to almost 32% to 34%. Almost 14 tannins have been found in the fruit and some of them are gallic acid, chebulagic acid and Polyphenols, Fatty acids, Triterpenoids, Glycosides and some of the flavonoids are also found [15]. Fruit contains tannin up to 30%, chebulic acid and gallic acid and some purgative constituents of the nature of Anthraquinone. Fruit contains tannin up to 30 %, chebulic acid and gallic acid and some purgative constituents of the nature of Anthraquinone.

Pharmacological actions

A study that shows the effect of *Terminalia Chebula* (*Haritaki*) on Serum Aspartate, Aminotransferase, Alanine Aminotransferase in Paracetemol induced liver damage in Wister Albino Rats- concluded that Terminalia chebula (*Haritaki*) may have some hepato protective role against paracetamol induced liver damage [16]. In vivo study on Hepatoprotective activity and the underlying mechanism of chebulinic acid from *Terminalia Chebula* fruit concluded hepatoprotective effects of Chebulinic acid in two animal models. Thus, claiming the Hepatoprotective, Anti-hepatitis virus activity, Hypolipidaemic, and Anti-inflammatory activity [17].

Terminalia Bellerica

Terminalia bellerica Roxb. (Family-Combretaceae) is a large deciduous tree reaches a height upto 30m, is widely distributed throughout the world especially Indian subcontinent, Srilanka, Pakistan, Nepal and South East Asia. Commmonly known as *Baheda* [18].

Ayurvedic Pharmacological Properties of *Terminalia Bellerica*

The drug is mainly *Kashaya* (astringent), *Laghu*, *Ruksha* in *Guna*, *Ushna* in *Virya* (potency), and *Madhura* (sweet) in *Vipaka* [6].

Chemical Composition of *Terminalia Bellerica*

Glucoside (bellericanin), Gallo-tannic acid, Coloring matter, resins and a greenish yellow oil. Ellagic acid, gallic acid, lignans (termilignan and thannilignan), 7- hydroxy 3'4' (methylenedioxy) flavone and anolignan. Tannins, ellagic acid, ethyl gallate, galloyl glucose and chebulagic acid, phyllemblin, β-sitosterol, mannitol, glucose, fructose and rhamnose [19].

Pharmacological actions review of *Terminalia Bellerica*

Antioxidant, anti-inflammatory and hepatoprotective activities of *Terminalia bellerica* and its bioactive component ellagic acid against diclofenac induced oxidative stress and hepatotoxicity concluded *T. bellirica* fruit constituents have enormous medicinal efficacy as an antioxidant, anti-inflammatory, and hepatoprotective agents [20]. The hepatoprotective activity of *T. belerica* fruit extract and its bioactive compounds have been revealed against CCl_4 induced liver injury in rats concluded that *T. belerica* fruit extract have hepatoprotective activity [21].
Thus, claiming to be Hepatoprotective.

***Aamalaki* (*Emblica officinale*)**

Emblica officinale (Family- Euphorbiaceae) is small to medium sized deciduous tree with an average height of 8-18 m, with thin light grey bark found throughout India seen abundantly in forests of North India and also known as Indian Gooseberry [22].

Ayurvedic Pharmacological Properties of *Emblica officinale*

It is *Amla* (sour) predominant *Panchrasa* (except *Lavana Rasa*) in nature, *Guru* (heavy), *Ruksha* (dry) and *Sheeta* (cold) in *Guna* (qualities), *Sheeta* (cold) in *Virya* (potency) and *Madhura* in *Vipaka* (taste developed through digestion). It is *Tridoshahara* in nature as it pacifies *Vata Dosha* due to *Amla Rasa*, *Pitta Dosha* due to its *Madhura Rasa* and *Sheeta Virya* and pacifies *Kapha Dosha* due to *Kashaya Rasa* and *Ruksha Guna* [7].

Chemical Composition of *Emblica officinale*

It primarily contains tannins, alkaloids, phenolic compounds, amino acids, and carbohydrate. Fruits have 28% of the total tannins distributed in the whole plant. The fruit contains two hydrolysable tannins Emblicanin A and B, one on hydrolysis gives gallic acid, ellagic acid, and glucose wherein the other gives ellagic acid and glucose respectively. The fruit also contains Phyllemblin. It contains Hydrolysable Tannins-Emblicanin A and B, Punigluconin, Pedunculagin, Chebulinic acid [23].

Pharmacological actions review of *Emblica officinale*
Hepatoprotective, Anti-inflammatory, Antioxidant, Immunomodulatory, Hypoglycemic actions

Hepatoprotective activity of *Emblica officinalis* and *Chyavanaprasha* concluded that EO and CHY extracts were found to inhibit the hepatotoxicity produced by acute and chronic CCl_4 administration [24].

***Daruharidra* (*Berberis aristata* DC)**

Berberis Aristata (Family-Berberidaceae) is a deciduous evergreen shrub found at an altitude of 7,000- 10,000 ft., and the root, stem bark, and fruit of *Berberis aristata* DC are used in Ayurveda. Known as Tree turmeric or Indian berberry [25].

Ayurvedic Pharmacological Properties of *Berberis aristata* DC

The drug is *Tikta* (bitter) and *Kashaya* (astringent) in *Rasa*, *Laghu*, and *Ruksha* in *Guna*, *Ushna* in *Virya* (potency), and *Katu* (pungent) in *Vipaka* thus pacify *Kapha Dosha* because of its *Ushna Virya* and *Tikta Rasa* (bitter) and pacifies *Pitta Dosha* because of its *Tikta Rasa* (bitter) [8].

Chemical Composition of *Berberis aristata* DC

Berberis aristata contains the alkaloids berbamine, Berberine, oxycanthine, epiberberine, palmatine, dehydrocaroline, jatrorhizine, karachine dihyrokarachine, taximaline, oxyberberine, aromoline and columbamine as well as terpenoids, flavanoids, sterols, anthocyanins, lignans, vitamins, proteins, lipids and carotenoids [26-28].

Pharmacological actions review of *Berberis aristata* DC
Hepatoprotective, Anti-inflammatory, Antioxidant, Immunomodulatory actions

The hepatoprotective effect of berberine was demonstrated on lab animals (mice), in which hepatotoxicity was induced by doxorubicin. Pretreatment with berberine significantly reduced both functional hepatic tests and histological damage (inflammatory cellular infiltrate, hepatocyte necrosis. The results study indicated that berberine could be effective in protecting the liver from acute CCl_4-induced injury [29].

***Guduchi* (*Tinospora Cordifolia* Willd)**

T. cordifolia (Family- Menispermaceae) is a large, glabrous, perennial, deciduous, climbing shrub of weak and fleshy stem thriving at high altitudes, it is also referred to as heart-leaved moonseed [30].

Ayurvedic Pharmacological Properties of *Tinospora Cordifolia* Willd

The drug is *Tikta* (bitter), *Kashaya* (astringent) *rasa*, *Snigdha*, *Laghu* in *Guna*, *Ushna* in *Virya* (potency), and *Madhura* (sweet) in *Vipaka* thus pacify *Tridosha* [9].

Chemical Composition of *Tinospora cordifolia* Willd

The chemical constituents of T. cordifolia belong to different classes such as alkaloids, glycosides, steroids, phenolics, aliphatic compounds, polysaccharides, leaves are rich in protein (11.2%), calcium and phosphorus. The stem contains clerodane furono diterpene glucoside (amritoside A, B, C, and D) [31].

Pharmacological actions review of *Tinospora cordifolia* Willd
Hepatoprotective, Immunosuppressive, Antioxidant, Hypotensive actions

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Protective Effects of *Tinospora cordifolia* water extract (TCE) on Hepatic and Gastrointestinal Toxicity was reported by Sharma et al., a significant increase in the levels of gamma-glutamyl transferase, aspartate transaminase, alanine transaminase, Triglyceride, Cholesterol, HDL and LDL ($P < 0.05$) in alcoholic sample whereas their level get downregulated after TCE intervention, patients showed the normalized liver function of *T. cordifolia* stand to relieve the symptoms [32].

Nimba (Azadiractha indica)

Azadiractha indica is a fast-growing (family-Meliaceae) that can reach a height of 15–20 metres. Commonly known as neem, nim tree or Indian lilac. Its fruits and seeds are the source of neem oil. It is derived from Sanskrit word *nimba* [33].

Ayurvedic Pharmacological Properties of *Azadiractha indica*

The drug is *Tikta* (bitter), *Kashaya* (astringent) in *ras*, *Laghu* in *Guna*, *Sheeta* in *Virya* (potency), and *Katu* in *Vipaka* and pacify *kapha* and *pitta dosha* [10].

Chemical Composition of *Azadiractha indica*

In addition to azadirachtin and related limonoids, the seed oil contains glycerides, diverse polyphenols, nimbolide, triterpenes, and beta-sitosterol. The yellow, bitter oil has a garlic-like odor and contains about 2% of limonoid compounds. The leaves contain quercetin, catechins, carotenes, and vitamin C [34, 35].

Pharmacological actions review of *Azadiractha indica*

Hepatoprotective, Anti-inflammatory, Antioxidant, Anti-diabetic actions

To investigate the hepatoprotective role of azadirachtin-A in carbon tetrachloride (CCl4) induced hepatotoxicity in rats. The group allotment for the animals used in the hepatoprotective study included a vehicle treatment group, CCl4 (1 mL· (kg body mass) (-1)) treatment group, silymarin (100 µg · (kg body mass) (-1)· day(-1)) + CCl4 treatment group, and groups treated with different doses of azadirachtin-A (100 or 200 µg· (kg body mass)(-1) · day(-1)) + CCl4. On the 9th day, blood was obtained for measuring the biochemical parameters, and liver tissue was obtained for pathological examination. The acute toxicity test with azadirachtin-A (500, 1000, or 2000 µg· (kg body mass)(-1)) indicated no mortality after 14 days of treatment; further, there was no change in behavior, food effects and possible teratogenic effects on the foetuses. All the groups were control-matched [36].

DISCUSSION

The *Rasapanchaka* of *Prataha-Kalik Yoga* also justifies its hepatoprotective activity along with its pharmacological action. Most of the drug have *Kashya rasa*, *Laghu* & *Ruksha* in *Guna*, *Ushna Veerya* & *Madhura Vipaka* as a dominant attribute. According to Acharya Sushruat, *Yakrut* has engendered from the *Rakta Dhatu*. Similarly, according to Acharya Arundatta, the three *Bhavapadarthas* take part in the formation of *Yakrut, Pleeha* & *Kloma* i.e., *Saman Vayu, Dehaushma* & *Raktja* Dhatu. It shows the major role of *Rakta Dhatu* in the development of *Yakrut.* According to Acharya Charak, *Kashaya Rasa* is *Samgrahi, Sandhankakr, Peedan, Ropana, Stambhan, Sleshm, Raktapittaprashaman* & *Shareerkledaupyokta* respectively. In a study, it was concluded that hyperlipidemia can be treated by *Ruksa Guna* property drugs assuming the condition to be an increase in *Snigdha Guna*. On the basis of the *Guna* concept, the applied medicine of *Ayurveda* could be developed. Among *Ashta Veerya, Laghu, Ruksha, Ushna*, and *Teekshna* contribute for *Langhana* and *Rukshaniya* effect. It is very explicit that *Laghu* and *Ruksha Guna* associated with *Teekshna Guna* and *Ushna Veerya* plays predominant role for eschewing vitiation of *Kapha Dosha* and *Medodhatu*. The constituents of the *Prataha-Kalik Yoga* are potential Hepatoprotective, Anti-inflammatory, Antioxidant and Immunomodulatory in action. Various experiment based on induced liver toxicity proved that all the drugs in *Prataha-Kalik Yoga* have potential hepatoprotective conduct individually.

CONCLUSION

The liver is responsible for an array of functions that help support metabolism, immunity, digestion, detoxification and vitamin storage. It has its usefulness involved in more than one system. In ayurveda it is the site where *Rasa* get transformed into the *Rakta*. So any disturbance in the functioning of the *Yakruta* will lead to *Dushita Rakta,* ultimately vitiating the succeeding *Dhatu* i.e.,*Mams, Meda, Asthi, Majja* & *Shukra* respectively. All the individual drugs show potential hepatoprotective activity. Therefore, there is a high probability that these drugs will be more effective potentially as one than the individual drugs. *Prataha-Kalik Yoga* also seems to be a potential hepatoprotective drug in this area. Its effectiveness as a hepatoprotective activity needs to be explored.

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