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## A REVIEW OF PHYSICO-CHEMICAL AND MEDICINAL POTENTIAL OF AN HERBAL FORMULATION, TRIKATU

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### ABSTRACT

Trikatu is composed of three acrid herbs, namely Maricha (Black Pepper), Sunthi (Ginger) and Peepli (Long Pepper). These herbs are combined in equal quantities, i.e., 1:1:1 to make Trikatu. It is a component of various ayurvedic formulations for restoration of disturbances in vatta, pitta and kalpa. Trikatu helps in enhancing the bioavailability of many constituents. Ayurveda recommends 1-3 g of Trikatu churna (powder) to be consumed for its therapeutic benefits. Long Pepper and Black pepper contain piperine, while *Zingiber officinalis*, i.e., ginger contains gingerols, shogaols, zingiberene. It is helpful in the treatment of digestive issues, tastelessness, skin diseases, nose and throat disorders like sinusitis and rhinitis, cough, asthma, obesity, polyuria and filariasis. It has antiviral, anti-inflammatory properties, expectorant, hypoglycemic, hypolipidemic, carminative and antiemetic potential. It also helps in weight loss/obesity, loss of appetite, constipation, gas or flatulence, indigestion, bloating, abdominal distension, irritable bowel syndrome (IBS). Its prescribed dosage is up to 1 g/day.

**Keywords: Black Pepper, Ginger, Long Pepper, Trikatu**

### INTRODUCTION

The name, Trikatu, indicates its own standing for its bitter taste. Three acrid herbs meaning, i.e., “tri” meaning three and “katu” that Trikatu consists of include Maricha,

Sunthi and Peepli; or Black Pepper, Ginger, and Long Pepper respectively [1]. These herbs combined in equal quantities, i.e., 1:1:1 form Trikatu [2]. Trikatu is also a component of various ayurvedic formulations for restoration of disturbances in the three doshas (tridoshas)- vatta, pitta and kalpha. Trikatu is known to calm down the increased vatta and kalpha and cause an increment in Pitta. Its taste is called katu, which means bitter, ushna or hot potency, dry (ruksha) and light (laghu) quality and therapeutic effect for digestion, i.e., Amapachaka. Trikatu, when studied in modern pharmacology, revealed its capability in enhancing the bioavailability of many constituents as well as in helping for betterment towards therapeutic goals [3].

### Preparation of Trikatu

Same quantities of all three herbs mentioned, i.e., dried fruits of *Piper nigrum* (black pepper), *Piper longum* (Long Pepper) and dried rhizomes of *Zingiber officinalis* are made into a fine powder in separate pestle and mortars and then mixed properly. The mix is then sieved through sieve of size BS mesh 80. This ensures a fine powder with more therapeutic value due to an increase in surface area. This powder, now known as Trikatu must then be stored in an airtight container free of moisture. The stored Trikatu can be used for further preparations, but should be kept moisture free [4] (Figure 1).



Figure 1: Preparation of Trikatu

## Dosage

Ayurveda recommends 1-3 g of Trikatu churna (powder) to be consumed with honey, which helps in masking the bitter taste, or with warm water to maximize therapeutic benefits. Trikatu is added to various Ayurvedic herbal formulations in quantities sufficient to enhance bioavailability of the main ingredients in the formulations by acting through multiple mechanisms. Upon addition to formulations, the sole pharmacological activities of Trikatu are suppressed due to the dosage not being in therapeutic amounts [4].

## Chemistry of Trikatu

Component herbs of Trikatu, namely Long Pepper and Black pepper contain piperine as their main chemical and biological marker with other constituents in trace quantities. *Zingiber officinalis*, i.e., ginger contains many other chemical constituents like gingerols, shogaols, zingiberene among others [4].

## Chemical Composition

### *Piper longum*

A large number of alkaloids and related compounds are found in Long pepper, with the most abundant being piperine, along with methyl piperine, piperettine, iperonaline, pellitorine, asarinine, piperlogumine, piperundecalidine, refractomide A,

piperlonguminine, brachystamide, pregumidiene, brachystamide A, pipericide, piperderidine, pipericide, brachystine, longamide and tetrahydropiperine, dehydropiperonaline, tetrahydropiperlongumine, piperlongumine, piperidine, trimethoxycinnamoyl-piperidine and piperine [5].

Lignans, pulvuatilol, sesamin, fargesin and more have been isolated from the fruit of *P. longum*. The fruits contain tridecyl-dehydro-pcoumaarate, eicosanyl-(E)-p-coumarate and Z-12-octadecenoic-glycerol-monoester. A complex mixture is observed in the essential oil of the fruit of *P. longum*, with three major components (excluding piperine), namely pentadecane and caryophyllene (both ~17.8 %) and bisbolene (11 %). Other compounds include terpinolene, zingibrene, thujone, p-cymene, dihydrocarveol and p-methoxyacetophenone [6].

### *Piper nigrum*

*Piper nigrum* is a known container of lignans, flavonoids, alkaloids, aromatic compounds, and amides. It also contains up to 3.5 % of essential oil, which consists of pinene, sabinene, phellandrene, limonene and linalool. Piperine is also a constituent, which is a weak base. Chavicine, an isomer of piperine; is not a known aromatic agent of black pepper. It's pungency results from piperine [7-8].

### ***Zingiber officinalis***

*Zingiber officinalis*, more commonly known as ginger contains over 400 compounds. Major constituents in the rhizomes of *Zingiber officinalis* include carbohydrates (50-70 %), terpenes, lipids (3-8 %) and phenolic compounds. Terpene compounds in ginger are  $\beta$ -bisabolene,  $\alpha$ -farnesene, zingiberene,  $\alpha$ -curcumene and  $\beta$ -sesquiphellandrene. Phenolic compounds include shogaol, gingerol and paradols. Shogaol and gingerols, respectively 18-25 % and 23-25 % are present in a higher quantity than other compounds [9].

### **Physicochemical Properties**

Besides, raw fiber, amino acids, protein, ash, phytosterols, minerals and vitamins like A and nicotinic acid. The constituents that

provide aroma are bisabolene and zingiberene. Contrarily, the pungency is the virtue of shogaols and gingerols. Other compounds related to gingerol and shogaols (1-10 %) present in the rhizome of ginger are 1-dehydrogingerdione, 6-paradol, 6-gingerdione and 10-gingerdione; 6-gingerdiol, 4-gingerdiol, 10-gingerdiol and 8-gingerdiol, along with diarylheptanoids. A mixture of volatile oils like gingerols and shogaols are responsible for the characteristic flavour and odour of ginger [9].

From a series of experiments performed by Hansa *et al.*, 2019, physicochemical properties of Trikatu churna was studied, and are as follow [10]:

**Table 1: Physicochemical parameters of Trikatu [10]**

Physicochemical Parameter	In House churna
pH	6.2
Total ash	3.5
Acid insoluble ash	1.5
Water soluble ash	2.2
Water soluble extractive	0.80 g
Alcohol soluble extractive	1.30 g
LOD	0.6118 cm <sup>3</sup>

From a screening for patients done by Das *et al.*, 2018 for their thyroid profile (TSH, T<sub>4</sub> and T<sub>3</sub>), 90 days post treatment, thyroid profile of the subjects was done again. As observation, it was notable that the group A, which had undergone Trikatu churna therapy, the patients regained euthyroid

state, wherein TSH levels came down to the normal limits. Associated symptoms of hypothyroidism, like constipation, fatigue, weight gain, muscle aches, depressed mood, lethargy, and indigestion were also notably reduced. In group B, wherein appropriate doses (1.6  $\mu$ gm/kg/d) of levothyroxine

sodium were administered, although euthyroid status was achieved, but symptoms related to hypothyroidism were not relieved in most patients. In most patients, T<sub>3</sub> and T<sub>4</sub> levels were in the normal range before the treatment began but no significant change was seen post treatment. Efficacy comparison between both treatments showed that Trikatu churna is less effective in achieving euthyroid state when compared to levothyroxine. However, Trikatu is a known effective replacement for levothyroxine as it helps in relieving the symptoms of hypothyroidism [11].

From study conducted by Sadanand *et al.* 2017, strong evidence has been noticed in the favour of efficacy of Trikatu with anupana koshnajala as an adjuvant against Diabetes Mellitus (Madhumeha) [12].

### **Medicinal Properties**

In the Ayurvedic medicine, Trikatu is a widely prescribed herb for the treatment of digestive issues, tastelessness, skin diseases, nose and throat disorders like sinusitis and rhinitis, cough, asthma, obesity, polyuria and filariasis. Traditionally known benefits exist, hand in hand with other health benefits like antiviral and anti-inflammatory properties, expectorant, hypoglycemic, hypolipidemic, carminative and antiemetic potential. It is a simple conclusion that trikatu is potent

enough to transform normal foods into an effective medication by increasing its absorption qualities [13].

The primary effect of Trikatu is on the stomach, pancreas, and the liver. The gastric secretions increase in the stomach upon intake of Trikatu. This stimulates digestion. The liver produces more bile salts when Trikatu is consumed, as it stimulates the functioning of the gall bladder. Trikatu has a positive effect on the functioning of pancreas too. Consequently, Trikatu affects the overall digestive system. Other than digestive benefits, Trikatu is known to better the functioning of the urinary, metabolic, and respiratory systems of the body, while also having a positive effect on immunity and skin [4].

The Trikatu powder is of known help in numerous conditions like weight loss/obesity, loss of appetite, constipation, gas or flatulence, indigestion, bloating, abdominal distension, irritable bowel syndrome (IBS), cough with white phlegm, common cold, asthma, gout, hypercholesterolemia, hypertension, atherosclerosis, and body ache [4, 14-15].

### **Caution**

Trikatu churna contains helpful herbs and spices, albeit excessive consumption can

have detrimental effects. Its known safe dosage is up to 1 g/day [4].

### Side-Effects

Trikatu has known side effects too, the most pronounced of which are heartburn and acidity. Other side effects upon excessive consumption can be noted as follows: burning sensation in throat, heartburn, burning aftertaste, sensation of heat in the body, sweating, ulcers in the mouth (uncommon), redness or burning sensation in eyes (uncommon) [4].

### Contraindications

These include burning sensation in any body part, such as abdomen, feet, hands, or throat, acid dyspepsia, red eyes, vomiting, skin diseases with irritation and burning, constipation with bloody stools or hard stools, high risk pregnancies, bleeding disorders, and threatened abortion [4].

### CONCLUSION

Trikatu is composed of three acrid herbs namely Black Pepper, Ginger, and Long Pepper, combined in equal quantities. It helps in restoring tridoshas. It is made by grinding all the three herbs separately and mixing their powder in equal quantities. The recommended dose is 1-3 g per day. It consists of piperine, gingerols, shogaols, zingiberene and many more bioactive as well as phenolic compounds (alkaloids,

flavonoids, antioxidants). It helps in maintaining blood glucose level, body weight, TSH, constipation, IBS, and cholesterol level. It also have antiviral and anti-inflammatory properties, expectorant, hypoglycemic, hypolipidemic, carminative and antiemetic potential, and helps in proper functioning of urinary, metabolic, and respiratory systems. It has side effects too. The noted side effects includes heartburn and acidity. So, proper administration is required.

### REFERENCES

- [1] Kesarwani K, Gupta R, Mukerjee A. Bioavailability enhancers of herbal origin: an overview. *Asian Pac J Trop Biomed.* 2013 3(4), 2013, 253-66. doi: 10.1016/S2221-1691(13)60060-X.
- [2] Meena A.K, Mangal A.K, Simha G.V, Rao M, Panda P, Singh H, Padhi M.M, & Babu R. Evaluation of Phamacognostic and Physicochemical Parameters of Trikatu churna - an Ayurvedic Classical Drug. *Research Journal of Pharmacy and Technology*, 4(12), 2011, 1882-1884.
- [3] Kaushik R, Jain J, & Khan A.D. Trikatu: Transforming Food into Medicines. *Innovations in Food Technology*, 2020, 501-508.

- [https://doi.org/10.1007/978-981-15-6121-4\\_35](https://doi.org/10.1007/978-981-15-6121-4_35)
- [4] Kaushik R, Jain J, Khan A.D, Rai P. Trikatu - A combination of three bioavailability enhancers. *International Journal of Green Pharmacy*, 12 (3), 2018, S437-441.
- [5] Zaveri M, Khandhar A, Patel S, Patel A. Chemistry and pharmacology of Piper longum L, *Int J Pharm Sci Rev Res*, 5(1), 2010, 67–76.
- [6] Kirtikar K.R, and Basu B.D., Eds. (1984) *Indian Medicinal Plants. Vol. III, Bishen Singh and Mahendra Pal Singh, Dehradun, Allahabad, 1664-1666. - References - Scientific Research Publishing.* (2016). Scirp.org.
- [7] Dahikar S, Bhutada S, Vibhute S, Sonvale V, & Kasture S. Evaluation of antibacterial potential of Trikatu churna and its ingredients: An in vitro study. *International Journal of Phytomedicine*, 2, 2010, 412-417.
- [8] Goswami T, & Meghwal M. Chemical Composition, Nutritional, Medicinal And Functional Properties of Black Pepper: A Review. *Journal of Nutrition & Food Sciences*, 01(S1), 2012.
- <https://doi.org/10.4172/scientificreports.172>
- [9] Prasad S, & Tyagi A.K. Ginger and Its Constituents: Role in Prevention and Treatment of Gastrointestinal Cancer. *Gastroenterology Research and Practice*, 2015, 1–11. <https://doi.org/10.1155/2015/142979>
- [10] Hansa R, Prashar B, Dhiman S. Preparation and Evaluation of Trikatu Churan. *IEARJ*, 03(06), 2019, 46-50.
- [11] Das N, Choudhary K, & Goswami K. Trikatu Churna in the Management of Hypothyroidism. *International Journal of Ayurveda and Pharma Research*, 6(4), 2018, 71-74.
- [12] Sadanand DV, Manjiri D.S, & Seema BS. Add On Effect Of Trikatu Churna With Glimeperide In Madhumeha Roga (N.I.D.D.M.). *Paripex - Indian Journal Of Research*, 6(3), 2017, 591- 593.
- [13] Reddy B.U, & Seetharam Y.N. Antimicrobial and Analgesic Activities Of Trikatu Churna And Its Ingredients. *Pharmacologyonline*, 3, 2009, 489-495.
- [14] Watt G, Thurston E, & Mukhopadhyaya T. A dictionary of

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the economic products of India, 1972. In *Open WorldCat*. Cosmo Publications.

<https://www.worldcat.org/title/dictionary-of-the-economic-products-of-india/oclc/693648>

- [15] Lakshmi N, Reddy N, Yamini K, & Gopal V. (n.d.). Anthelmintic activity of aqueous and ethanolic extract of Trikatu Churna. *Journal of Applied Pharmaceutical Science*, 2011(03), 140–142.

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