REVIEW ARTICLE

Talapotaka Churna: A prudent permutation by Acharya Vallabhacharya

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Abstract

Talapotaka Churna is one of the best classical formulations mentioned for the treatment of *Prameha* in Vaidya Chintamani. Each of the ingredients has been proven classically and scientifically to be very effective in the management of *Prameha* and diabetes mellitus, respectively. The view of Acharya Vallabhacharya toward the management of *Prameha* is straightforward by such a wise permutation in a specific proportion with precise *Anupana*. There are many such classical formulations where the logic behind combination by ancient Ayurveda scholars should be validated or compared with the corresponding modern entity. The same attempt has been made in this review, where it is observed that Acharya Vallabhacharya had prepared *Talapotaka Churna* with a scientific vision, as published research work supports the same.

Key words: Acharya, Ayurveda, diabetes mellitus, *Prameha, Talapotaka Churna*

INTRODUCTION

Most classical formulations have been recollected by *Sangrahagrantha* of succeeding eras for the same indications, e.g., a number of formulations from Charaka and Sushruta are quoted by Vagbhata. Similarly, most formulations have recalled from *Brihatrayi* to the classical text of next generation. However, "*Talapotaka Churna,"* a classical herbal formulation, is an exception to the above statement. Acharya Vallabhacharya of the 15th century, who wrote "Vaidya Chintamani" a classical text, has quoted the formulation *Talapotaka Churna* in the 20th chapter, *Prameha Prakarana*. Apart from this classical text, not a single classical text repeated this formulation as it is or with the same or different name in *Prameha Chikitsa.* In Vaidya Chintamani, it is mentioned that *Talapotaka Churna* has "*Sarvaprameha hara"* property. *Prameha/ Madhumeha* can be considered as diabetes mellitus by different perspectives[1] based on clinical symptoms, and attempts have been made by Ayurvedic physicians and researchers to treat these two entities using classical formulations mentioned in *Prameha Chikitsa.* With the same reference, in this article, efforts are taken to highlight the wise combination of ingredients of *Talapotaka Churna* by Acharya Vallabhacharya to treat the specific *Prameha* along with the proven antidiabetic actions of each ingredient by different mechanisms in a multitude of studies.

ABOUT *TALAPOTAKA CHURNA*

The name of this formulation, like many Ayurvedic polyherbal preparations, is kept according to the major or main ingredient of that formulation. *Talapotaka* is a synonym of *Avartaki* plant. The exact classical reference for this synonym remains elusive. One book published by CCRAS (Siddha-Vaidya-Saral Upchar Pranali, CCRAS, 3rd ed., CCRAS, Delhi, 2005) has mentioned the synonym of *Avartaki* as *Talapotaka* in Sanskrita.[2] *Talapotaka Churna* has four commonly available ingredients as mentioned in Table 1.

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Avartaki (*Cassia auriculata*)

Classical view

The main ingredient of the formulation is *Avartaki*. The first and most elaborated description of *Avartaki* in a classical text is available in *Kaiyadeva Nighantu,* where its *Pramehaghna/ Madhumehaghna* action through different botanical parts of the plant has been mentioned. *Kaiyadeva Nighantu* is written by *Kaiyadeva* in the 15th century, and Acharya Vallabhacharya wrote Vaidya Chintamani also in the same period. The selection of *Avartaki* as the main ingredient in *Talapotaka Churna* may be due to the geographical proximity and time period of both texts. According to *Kaiyadeva Nighantu*, the flower has *Pramehashamana* property. The tender fruits have been indicated as *Sarvapramehahara*. The seeds are said to be *Madhumehaghna,* and the root is used as *Pramehaghna*.[4] No other classical reference to *Avartaki* has been found including *Brihatrayi, Laghutrayi,* and *Bhavaprakash Nighantu*.

Table 1: Ingredients of *Talapotaka Churna*[3]

Name of ingredients	Part used	Proportion of ingredient	Percentage
C. auriculata	Whole part	4 part	50
E. officinalis	Fruit	2 part	25
C. longa	Rhizome	1 part	12.5
B. aristata	Stem	1 part	12.5

C. auriculata: Cassia auriculata, E. officinalis: Emblica officinalis, C. longa: Curcuma longa, B. aristata: Berberis aristata

Modern/contemporary view

C. auriculata has been investigated by a number of researchers to elucidate the exact mechanism by which effective therapeutic outcomes occur for diabetes mellitus. Many experimental studies have been published using different parts of the plant and with different extracts. In case of diabetes, there are complex metabolic disturbances due to which complications run parallel to the disease. The herbal plant contains a number of phytoconstituents which show different modes of action and prevent, suppress, or cure the disturbances at the same time. Similarly, *Avartaki (C. auriculata)* has been established to have different modes of action scientifically in diabetes-induced experimental models, which are mentioned in Table 2.

Amalaki (*E. officinalis*)

Classical view

Amalaki is one of the most frequently used *Dravya* in the formulations quoted in *Prameha Chikitsa* in all classical texts. *Amalaki* has been used as one of the main ingredients in the preparation of various *Rasayana Kalpa* such as *Brahma Rasayana*, *Dhatri Rasayana*, and *Chyavanaprasha*. The classical text *Bhavaprakash Nighantu* has mentioned *Amalaki* as *Pramehaghna* drug in *Haritkyadi Varga*;[15] and both *Raja Nighantu* in *Amradivarga*[16] and *Kaiyadeva Nighantu* in *Aushadhi Varga*[4] have mentioned *Prameha hara* property of *Amalaki*.

Table 2: Different modes of action of *C. auriculata*

Plant/part of *C. auriculata* plant	Intervention	Experimental model	Study outcome
Leaf	Aqueous extract	STZ-induced diabetic rats	Rise in glycogen content Histopathological-increased number of islets and beta-cells Insulinogenic action[5]
Flower	Aqueous extract	STZ-induced diabetic rats	Suppresses enhanced gluconeogenesis Enhances utilization of glucose through increased glycolysis[6]
Flower	Aqueous extract	STZ-induced diabetic rats	Inhibits the alpha-glucosidase enzyme[7]
Cassia auriculata	Herbal formulation	Alloxan-induced diabetic rats	Increased the activities of SOD and CAT Antioxidant potential[8]
Bark	Aqueous extract	STZ-induced diabetic rats	Regenerative capability of the renal tubules and ability to improve renal damage Hepatoprotective effect[9]
Flower	Aqueous extract	STZ-induced diabetic rats	Antihyperlipidemic effect[10]
Flower	Aqueous extract	STZ-induced diabetic rats	Antiperoxidative effect[6]
Leaf	Aqueous extract	STZ-induced diabetic rats	Hypolipidemic activity[11]
Flower	Aqueous extract	STZ-induced diabetic rats	Antioxidant effect[12]
Flower	Aqueous extract	Alloxan induced diabetic rats	PTP-1B inhibitory activity[13]
Whole plant	Aqueous extract	STZ-induced diabetic rats	Hypoglycemic effect[14]

C. auriculata: Cassia auriculata, STZ: Streptozotocin, PTP-1B: Protein tyrosine phosphatase 1B, SOD: Superoxide dismutase, CAT: Catalase

Modern/contemporary view

E. officinalis is a very common botanical which has been tested by modern scientists for its various therapeutic potential. It is used in a number of disease conditions including diabetes mellitus, cancer, ophthalmic diseases, peptic ulcers, and general debility, due to its various beneficial health effects. Clinically and experimentally, *E. officinalis* has been proven for the prevention of diabetic complications along with its strong antioxidant effect. Several scientific studies showing various modes of actions in the case of diabetes mellitus are mentioned in Table 3.

Haridra (Curcuma longa)

Classical view

Haridra is the most common *Dravya* used in all classical texts for the management of *Prameha*. *Nisha-amalaki* combination is one of the best examples used by Ayurvedic physicians for *Prameha* and is quoted as the best one by Acharya Vagbhata in *Prameha*.[26] It is seen that *Haridra* is very commonly used along with *Amalaki* in several classical formulations. *Talapotaka Churna* is no exception for the same. *Bhavaprakash Nighantu, Dhanvantari Nighantu,*[27] and *Kaiyadeva Nighantu* have mentioned *Meha hara* property of *Haridra*. According to Vagbhata, the best medicine for *Prameha* is *Haridra* (*Haridra Pramehaharanam*).[28]

Modern/contemporary view

Many studies have well established that curcumin, the polyphenolic concentrated compound in *C. longa,* is responsible for most of its pharmaceutical actions. *C. longa* is proven antidiabetic, anticancer, and antilipidemic drug. It works through different modes of action. The scientific data showing the antidiabetic activities of *C. longa* are mentioned in Table 4.

Table 3: Different modes of action of *E. officinalis*

Plant/part of *E. officinalis*	Intervention	Experimental model	Study outcome
Leaves	Methanolic extract	STZ-induced diabetic rats	Normalize the impaired antioxidant status Rapid protective effects against lipid peroxidation by scavenging of free radicals and reducing the risk of diabetic complications[17]
Fruit	Dry powder	Human (35-55 years)	Antihyperlipidemic Prevention of atherosclerosis[18]
Fruit	Aqueous extract	STZ-induced diabetic rats	Anti-nociceptive property Curative and preventive property in diabetic neuropathy[19]
Fruit	Ethyl acetate and methanol fraction	STZ-induced diabetic rats	Useful in diabetes-induced neuropathy by reducing level of sciatic nerve MDA and elevating pain threshold level[19]
Fruit	Fruit juice	STZ-induced diabetic rats	Decreased glucose level by enhancing insulin sensitivity Prevented cardiac muscular damage by lowering levels of LDH and CK-MB in serum Inhibiting the production of ROS by elevating the levels of antioxidant enzymes in diabetic heart[20]
Fruit	Fruit juice	STZ-induced Type I diabetic rats	Amla fruit ash contains chromium. Chromium, a trace element possesses significant anti diabetic activity Improved deranged lipid metabolism Insulin derived with chromium is capable of reversing blood sugar, serum cholesterol and phospholipids levels to those of normal rats[21]
Fruit	Aqueous extract	Alloxan-induced diabetic rats	Significantly decreased the blood glucose level Induced hypotriglyceridemia Improve liver function by normalizing the activity of liver specific enzyme ALT[22]
Fruit	Fruit juice powder	*In vitro*	Scavenging of hydrogen peroxide The presence of phenolic compounds and flavonoids acknowledge the antioxidant activity[23]
Fruit	Fruit powder (along with jamun and bitter gourd powder)	Human	Normalized an enzyme alanine transaminase[24]
Fruit	Fruit juice (mixed with fresh bitter gourd juice)	Human	Stimulate the islets of Langerhans[25]

E. officinalis: Emblica officinalis, MDA: Malondialdehyde, LDH: Lactate dehydrogenase, CK-MB: Creatine kinase, ROS: Reactive oxygen species, ALT: Alanine transaminase, STZ: Streptozotocin

Table 4: Different modes of action of *C. longa*

Plant/part of *C. longa* plant	Intervention	Experimental model	Study outcome
Rhizome	Ethanolic extract	Genetically diabetic KK-Ay mice	Hypoglycemic results[29]
Rhizome	Aqueous extract	Alloxan-induced diabetic rats	Antioxidant Reduce fasting blood glucose level[30]
Rhizome	Curcumin	STZ-induced diabetic rats	Improved glycemic effect Hypolipidemic effect Antioxidative effect[31]
Rhizome	Curcumin	Isolated mice hepatocytes	Anti-diabetic effects of curcumin are partly due to a reduction in hepatic glucose production[32]
Rhizome	Curcumin	Diabetic-induced mice	Hypolipidemic effect in Type 2 diabetes[33]
Rhizome	Curcumin	STZ-induced diabetic rats	Prevents STZ-induced islet damage by scavenging free radicals[34]
Rhizome	Curcumin	STZ-induced diabetic rats	Anti-renal lesion effect[35]
Rhizome	Extract	Alloxan-induced diabetic rats	Damage caused by diabetes can be prevented by regulating the depletion of antioxidant enzyme cascade[36]
Rhizome	Ethanolic extract	Diabetic-induced rats	Reduces blood sugar level, hemoglobin and glycosylated hemoglobin levels[37]
Rhizome	Curcumin	Diabetic induced rats	Reduces oxidative stress in diabetic induced rats having increased NADPH/NADP ratio as well as increased activity of oxidative enzymes[37]
Rhizome	Curcumin	Diabetic induced rats	Prevents galactose-induced cataract formation at very low doses[37]
Rhizome	Curcumin	STZ-induced diabetic rats	A potent antioxidant agent and free radical scavenger[38]
Rhizome	Curcumin	STZ-induced diabetic rats	Antidiabetes activity by lowering the blood glucose level[39]
Rhizome	Curcumin	STZ-induced diabetic rats	Significantly attenuates both renal dysfunction and oxidative stress in STZ-induced diabetic rats[40]
Rhizome	Curcumin	STZ-induced diabetic rats	Increases plasma insulin and hepatic glycokinase activity levels in diabetes[41]
Rhizome	Curcumin	Alloxan-induced diabetic rats	Prevents galactose-induced cataract formation Decreases advanced glycation end products induced complications in diabetes mellitus[42]
Rhizome	Curcumin	STZ-induced diabetic rats	Delay the development of a cataract[43]
Rhizome	Curcumin	Diabetic induced rats	Reported to help treat cataract and nephropathy in diabetic rats[44]
Rhizome	Curcumin	STZ-induced diabetic rats	Pancreatic islet regeneration Improves insulin synthesis and secretion[45]

C. longa: Curcuma longai, NADP: Nicotinamide adenine dinucleotide phosphate, STZ: Streptozotocin

Daruharidra (Berberis aristata)

Classical view

Daruharidra is used in *Prameha Chikitsa* by Acharya Charaka, Sushruta, and Vagbhata. *Daruharidra* as a *Prameha nashak* drug is quoted by only *Dhanvantari Nighantu*.[27] *Bhavprakash*[15] and *Kaiyadeva,*[4] however, have mentioned that the properties of *Daruharidra* should be considered same as per *Haridra* but not quoted as *Prameha hara* property specifically.

Modern/contemporary view

Many studies have proven that most of the pharmaceutical actions of *B. aristata* are due to the presence of Berberine alkaloid. The antidiabetic action of *B. aristata* has been investigated for a different mode of action in preventing the diabetic-associated complications and the mechanism by which it gives its glucose-lowering effect. The various research data showing different modes of action in diabetes with its related complications are mentioned in Table 5.

Table 5: Different modes of action of *B. aristata*

Plant/part of *B. aristata* plant	Intervention	Experimental model	Study outcome
Stem	Methanolic extract	STZ-induced diabetic rats	Hypoglycemic and hypolipidemic activity Reduces serum glucose levels May enhance activity of enzymes involved in bile acid synthesis and its excretion and this may have decreased in serum cholesterol Decreased serum triglycerides level significantly[46]
Stem	Berberine	-	Lowers elevated blood total cholesterol, LDL cholesterol, triglycerides and atherogenic apolipoproteins[47]
Stem	Berberine	-	Increasing the production of a receptor protein in the liver that binds the LDL-cholesterol, preparing it for elimination[47]
Stem	Berberine	Human	Patients had less thirst, consumed less water and urinated less, had improved strength, and had lower blood pressure; the symptoms declined in correspondence with declining blood glucose levels Reducing blood sugar by inhibiting absorption of sugars from the intestine Enhancing production of insulin[47]
Stem	Berberine	Human	The hypoglycemic effect of berberine was similar to that of metformin Significant decreases in hemoglobin A1c was observed[47]
Root bark	Powder	Human	Stimulates pancreas to secret insulin[48]
Stem	Berberine	Human	Major symptoms of diabetes disappeared, patients strength improved, blood pressure became normal and blood lipids decreased[49]
Stem	Berberine	Diabetic induced rats	Promotes regeneration and functional recovery of β-cells[49]

B. aristata: Berberis aristata, LDL: Low-density lipoprotein

Takra (Buttermilk)

Takra is used as *Anupana* of *Talapotaka Churna* according to Acharya Vallabhacharya in *Prameha Chikitsa*. The main action of *Anupana* is to distribute the medicaments throughout the body at the earliest time. It should spread like oil drop on water in all directions quickly and exhibit the effect of the drug to relieve the disease condition.[50] Along with this, the *Anupana Dravya* has its own pharmacological properties that aid the overall effect. According to *Bhavaprakash Nighantu*, *Takra* has *Pramehanashak* and *medorogahara* property. Furthermore, *Takra* regulates the digestion and prevents the abdominal disturbances.[15]

Probable Antidiabetic Action of *Talapotaka Churna* According to Ayurvedic Point of View

Prameha in its pathological path involves all three *Doshas*. However, *Kapha Dosha* has dominance in the initial stages of disease progression. This vitiated *Kapha Dosha* easily affects structures similar to it, such as *Meda* and *Kleda* in the body, which then become excess in quantity and disturb proper functioning due to their deranged metabolic form, thus affecting all other constituents of the body. The condition of *Prameha* produces excessive physiological body secretions. Therefore, the plan of treatment is decided by considering the targets of vitiated *Doshas*, mainly *Kapha* and *Pitta*, excess *Meda Dhatu* in its pathological form, and excessive *Kleda* due to vitiated *Kapha Dosha*. Due to these, there is increased intensity and frequency of *Mutra* (urine) to clear this excessive *Kleda* from the body.

The task of properly and competently preparing a polyherbal formulation to treat *Prameha* requires careful consideration of the above pathological factors and disturbed physiology of the body. Drugs must be selected that treat and correct these conditions systematically according to their pathogenesis over time. The drug must have *Kapha* and *Pittadoshahara* properties with the complementary *Gunas* needed and opposite characteristics with all causative factors. For example, *Dravya* (herbal drugs) is preferred that do not have *Madhura Rasa* and *Vipaka*. They should not have *Guru* and *Snigdha Guna*. The *Dravya* should have *Medohara* and *Kledaghna* property.

Talapotaka Churna was developed with consideration of the above-mentioned properties and is, therefore, a well-balanced combination in all aspects. *Avartaki*, *Haridra,* and *Daruharidra* have almost completely synergistic properties that directly act on *Samprapti* (pathological progression) of *Prameha*. *Amalaki* is added wisely by *Acharya* to directly act on *Prameha* as well as counteract or control the untoward effects of other three drugs such as *Avartaki, Haridra,* and *Daruharidra*. Because they normalize *Kapha* and *Pitta Dosha* but vitiate *Vata Dosha*, *Amalaki* is added due to its ability to control *Vata Dosha*. In addition, *Avartaki*

Table 6: Properties of ingredients of *Talapotaka Churna*[51]

Name of drug	*Guna*	*Rasa*	*Vipaka*	*Virya*	*Doshaghnata*	Other
Avartaki	*Laghu, Ruksha*	*Kashay, Tikta*	*Katu*	*Sheeta*	*Kapha-Pitta*	-
Haridra	*Laghu, Ruksha*	*Tikta, Katu*	*Katu*	*Ushna*	*Kapha-Pitta*	Lekhaniya, Kandughna
Daruharidra	*Laghu, Ruksha*	*Tikta, Kashay*	*Katu*	*Ushna*	*Kapha-Pitta*	Lekhaniya, Kandughna
Amalaki	*Guru, Ruksha*	*Panch Rasa* (Amlapradhan)	*Madhur*	*Sheeta*	*Tridosha (Pitta)*	Vayasthaapaka, Rasayana

and *Daruharidra* should cause *Malabaddhata* (constipation) by their *Kashay – Tikta Rasa*, *Laghu,* and *Ruksha Gunas.* However, *Amalaki* with *Sara Guna*, *Amlapradhan Rasa*, *Madhur Vipaka,* and *Haridra* having *Pittarechaka Guna* counteracts this unwanted effect. All four drugs have *Ruksha Guna* which prevents excessive secretions in the body, while also targeting *Kapha* and *Pitta Dosha*. *Haridra* and *Daruharidra* have *Lekhaniya* and *Kandughna (Kledanashak)* properties which directly act on excessive *Meda Dhatu* and excessive *Kleda*. *Amalaki* is included in *Vayasthapana Gana* and is the best *Rasayana* drug in *Prameha.* A summary of the properties of the four *Dravyas* in *Talapotaka Churna* is mentioned in Table 6.

DISCUSSION AND CONCLUSION

Talapotaka Churna is a classical herbal formulation of the 15th century. Acharya Vallabhacharya formulated it for *Prameha* by the known properties of each ingredient. It was prepared judiciously to get maximum therapeutic efficacy according to the science of the 15th century. In this age of reverse pharmacology, there is a demand for using biochemistry, chemical synergism, and modern tools for elucidating the reasoning behind any formulation. Despite this, the Ayurvedic course of drug discovery did not go from "laboratories to clinic" according to preset molecules and theories that evolves with each new scientific discovery, but rather from "clinic to laboratories," in which the true evidence of patient benefits were aligned with *Dosha-dhatu* theory and a way of looking at the universe that respects the use of drugs for the body. True reverse pharmacology approaches are those that use clinical data to rationalize what the mechanism of action will be and may rationalize why certain molecules are present in such well-composed formulations. This road to drug discovery would evolve the understanding of Ayurvedic formulations and respect experiential clinical evidence as the foundation of true understanding.

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