



Review Article

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ROLE OF GUGGULUPANCHAPALA CHOORNAM IN MANAGING THE COMPLICATIONS OF TYPE 2 DIABETES MELLITUS: A REVIEW

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ABSTRACT

Diabetes mellitus is a metabolic disorder characterised by hyperglycaemia resulting from defects in insulin secretion, insulin action or both. The disease is classified based on physiological status, mainly categorised into type 1 and type 2. Recent studies show that type 2 diabetes mellitus is being considered as being caused due to the impairment in the immune system, which has already been explored as one of the reasons causing diabetes or prameha in Ayurveda. The patients of prameha inherently carry the risk of impaired agni and depleted ojas status, that is, hypometabolic and immunocompromised state. The primary goal is not merely to achieve normoglycemia but also to minimise its complications. In this context, many Ayurvedic drugs are undergoing extensive research. The chronic complications of diabetes are broadly divided into microvascular and macrovascular, with the former having a much higher prevalence than the latter. Microvascular complications include neuropathy, nephropathy, and retinopathy, while macrovascular complications include cardiovascular disease, stroke, and peripheral artery disease (PAD). This choornam is presumed to act as an agent to clear occlusions in the microvascular and macrovascular vessels, and this article intends to delve deeper into the mode of action of Guggulupanchapala choornam in breaking the samprapathi of prameha and its associated comorbidities. This article is an attempt to shed some light on the application of Guggulupanchapala choornam in the treatment of prameha and thereby reducing the various complications which follow it.

Keywords: diabetes mellitus, agni, Guggulupanchapala choornam

INTRODUCTION

Hyperglycemia caused by abnormalities in insulin secretion, insulin action, or both is a hallmark of diabetes mellitus, a group of metabolic diseases. The disease is divided into types 1 and 2 based on physiological status. According to recent investigations, type 2 diabetes mellitus is thought to be brought on by immune system dysfunction, which researchers have already investigated as one of the causes of diabetes in Ayurveda.¹ The word "Prameha" is made up of the subwords "Pra" and "Meha". Mehati, Sinchati Mutraretansi, meaning to excrete, is formed from the root "Mih Secane" to form the term Meha. Ojas and vyadhikshamatva are crucial in Ayurveda for maintaining healthy bodily functions.

Patients with Prameha are predisposed towards hypometabolism and immune compromise, characterised by diminished agni and depleted ojas. Now, achieving normoglycemia is only one of the main objectives; the other is reducing its complications. Many Ayurveda medicines are currently the subject of in-depth investigation in this regard.²

Vyadhi-ksamatva (immunity), as a concept, is crucial to human welfare daily and to preventing and treating illnesses. Etiological factors attempt to cause disease when they touch the body. The body works to fend against the illness concurrently. Immunity refers to the body's capacity to prevent disease development or withstand an illness.

In Ayurveda, vyadhi-kshamatva refers to more than just immunity against a particular pathogen or illness, such as typhoid, measles, or rubella, for which contemporary medicine offers "immunisations". Instead, vyadhi-kshamatva suggests resistance to losing the proportion, integrity, and interrelationship between a person's doshas and dhatus (tissues).

Resistance to disease or immunity against disease is of two kinds, i.e., one which attenuates the manifested diseases and another variety prevents the manifestation of diseases.

Globally, Type 2 Diabetes (T2D) is a significant health concern. High blood glucose levels brought on by insufficient insulin synthesis by the pancreas are a sign of this metabolic disorder. The immunological response to elevated blood glucose levels and the presence of inflammatory mediators made by adipocytes and macrophages in adipose tissue leads to an inflammatory response. The pancreatic beta cells are damaged by this low-grade, persistent inflammation, inhibiting the synthesis of enough insulin and causing hyperglycemia. Diabetes-related hyperglycemia is hypothesised to impair the immune system, making it less effective at stopping the spread of foreign pathogens in diabetic subjects. As a result, it is known that diabetic people are more vulnerable to infection-related autoantibodies.

Infections and related problems will occur more frequently due to the increased prevalence of T2D. One of the metabolic disorders,

diabetes mellitus also affects the body's immune system because it is an autoimmune illness via an antigen-antibody interaction involving CD4+, CD8+, T cells, and autoantibodies, kills the pancreatic Langerhans cells of the pancreatic Islet of Langerhans.³

Diabetes and its complications are becoming disturbingly more common everywhere. Immuno modulators are a class of drugs or dietary supplements that boost immunity by synthesising various immune-stimulating substances like interferons. Diabetes is known to cause a decline in cell immunity, which can lead to several issues.

Insulin resistance, the primary contributing factor to metabolic syndrome, is a disease in which muscle, fat, and liver cells do not respond to insulin as intended, making it difficult for the body to quickly absorb glucose from the bloodstream. As a result, the body needs more insulin to assist glucose absorption into cells.

The beta cells of the pancreas try to keep up with the increased demand by producing more. But over a period, these overstressed cells stop functioning, thus leading to pre-diabetic and/or diabetic conditions.

According to Ayurveda, this is caused by agnimandya, strotorodha (cell resistance to insulin), kledotpatti, dhatu shaithiya, asara dhatu nirmiti, and dhatvaghni mandya (inappropriate cell-metabolism, improper or reduced absorption of sugar), which together lead to Prameha. As a result of frequent indulgent etiological factors, the body fluid, when combined with humours and adipose tissue, develops pathological characteristics. These frequent indulgent causes include Kapha vardhakara aahara (diet increasing and vitiating kapha), avoidance of cleanliness, divaswapna (sleeping in the afternoon), swapnasukha (sleeping for long hours), asyas (diabetes).⁴

The vyadhikshamatva in this instance, in the forms of vyadhibala virodhitvam (diminishing the manifested disease) and vyadhi utpadha pratibandhakatvam (avoiding the manifested one), gives us the impression that the vikara vighatha bhava aid in disease resistance.

Concept of Prameha w.s.r to diabetes mellitus

There is an increasing eagerness to know about all aspects of Ayurveda in the present era all over the globe. However, Diabetes has been termed a silent killer, and recent evidence of "Insulin resistance" and side effects from prolonged administration of conventional drugs have triggered the search for safe and effective alternatives.

There are 20 subtypes of Prameha due to the interaction of the three doshas and 10 dushyas (disturbed functioning of the principles that support the various bodily tissues); several of these subtypes have sweet urine, whereas some of them have different colouration of the urine, highlighting the inflammatory conditions involved in the metabolic syndrome. This disease has close ties to sthaulya (i.e., obesity). With regard to diabetes mellitus, Sahaja Prameha and Jatah Pramehi correlate with type 1 diabetes; apathyanimittaja Prameha correlates with type 2 diabetes

This illness is closely related to sthaulya (i.e., obesity). Sahaja Prameha and Jatah Pramehi correlate with type 1 diabetes, whereas apathyanimittaja Prameha connects with type 2 diabetes in terms of diabetes mellitus.

Madhumeha is a subtype of Vataja Prameha (Prameha with Vata predominance), which can manifest as type 1 diabetes starting in

infancy or as the advanced stage of type 2 diabetes, requiring insulin. In one of the oldest writings on Ayurveda, Charaka Samhita, the latter is described as Jatah Pramehi Madhumehino.

It is possible to compare the "Pittadharakala" described in the Susruta Samhita tissue" of the pancreas and the "Pittatejas" produced from the pithadharakala to hormones like insulin, glucagon, etc., while also emphasising the "Amlavipaka karma" that takes place in the grahani (duodenum), which includes the intestinal tract, on par with the functions (insulin and glucagon). It is clear from such reasoning that ancient Indian physicians had a thorough understanding of the importance of processes occurring at the grahani with regard to carbohydrates and their influence on the development of diseases like diabetes.

Consequently, it can be concluded that the pittatejas and pittadharakala play a significant role in the body's metabolic processes, which, when functioning correctly, also preserve the equilibrium of the doshas.

"Mithyavaravivaha" is connected to the Ayurvedic idea of disease manifestation (Improper dietary habits and physical exertion). Regarding the causes of various diseases, this idea needs to be understood in various ways. According to ancient Indian physicians, the following dietary and physical conditions might cause pramehas: a. Foods with brmhana-like qualities (containing more carbohydrates and fat than proteins). (Cold in nature and conduct) sithaveerya amla rasas (consisting of more acidic properties). Snigdha guna (Which increases Kapha dosa, medo dhatu and mutra mala), smoking and binge-eating habits. Ancient Indian physicians highlighted the following physical variables predisposed to diabetes.

- The habit of consuming foodstuff with madhura rasa (sweet taste).
- The habit of indulging in excessive sleep, especially in the daytime.
- Excessive indulgence in sexual and other sedentary habits etc.

These can vitiate the Kapha dosa, which leads to diabetes. Apart from the above factors, climate and geographical nature also plays a role in the manifestation of diabetes.

One of the causes of type 2 diabetes mellitus presentation is ojas (immunity) depletion. Also, people with type 2 diabetes who lack immunity are more susceptible to infections because uncontrolled glucose levels are a favourable environment for various bacteria to flourish. Overall, it was shown that problems were minimal among patients whose compromised immune systems had been improved.

Guggulupanchapala choornam

Guggulupanchapala choornam is a compound formulation mentioned in nadvirana (Bhagandhara chikitsa). The ingredients are as mentioned below. The dose is one karsha (12 gm) in divided doses.

Table 1: Guggulupanchapala choornam Ingredients

Sanskrit name	Botanical Name	Quantity
Shuddha guggulu	<i>Commiphora mukul</i>	248 gm
Pippali	<i>Piper longum</i>	46 gm
Haritaki	<i>Terminalia chebula</i>	46 gm
Vibitaki	<i>Terminalia belirica</i>	46 gm
Amalaki	<i>Emblica officinalis</i>	46 gm
Twak	<i>Cinnamomum zeylanicum</i>	12 gm
Ela	<i>Elettaria cardamomum</i>	12 gm

DISCUSSION

Atherosclerosis, one of the vascular complications of diabetes that results in the narrowing of arterial branches in specific body parts, is the primary pathological mechanism of macrovascular disease. The result of persistent irritation and damage to the arterial wall in the peripheral or coronary vascular system is the idea of atherosclerosis. LDL particle-derived oxidised lipids build up on the artery endothelium wall due to endothelial damage and inflammation. The oxidation of such particles can also be aided by angiotensin II. When the monocytes differentiate into macrophages and enter the artery wall, they gather oxidised lipids to create foam cells.

Once foam cells have developed, they promote the growth of macrophages and draw T lymphocytes to them, encouraging the development of clean muscles and the buildup of collagen in the artery zone. Overall, this leads to the development of fibrous-capped, lipid-rich atherosclerotic lesions. Acute vascular infarction results from the rupture of the lesion. This can be correlated to the prameha samprapthi where due to the various nidanas, accumulation of ama occurs in rakta, mamsa and meda dhatu due to the samana guna of kapha which in turn leads to the decrease in the medo, dhatu agni and leads to the dusti of medo dhatu leading to an excessive formation of adipose tissue.

One of the main reasons for the formation of bahu drava shleshma in prameha is due to the conversion of badha medas to abadha medas, which in turn vitiates the successive dhatus. It is in this context we can discuss the role of Guggulupanchapala choornam. Though the formulation is mentioned under bhagandara prakaranam or nadi vrana chikitsa, we can see that the dushtyas and dhatus involved in the samprapthi of bhagandaram are similar to that of prameham.

It has the ability to when used in combination with madhu. It aids in treating granthi, vrana and medo roga vikaras because of its anti-inflammatory and antioxidant characteristics.

Mode of action of Guggulupanchapala choornam

Guggulu (*Commiphora mukul*) has anti-inflammatory and analgesic properties.⁵ It is ruksha (dry), lekhana (scrapping), laghu (light), tikshna (sharp), vishadha (clear), sara (mobile), dipana (carminative), anulomana (agents removing doshas in a downward direction), medohara, (reducing medas), Kapha - daurgandhya hara, rakta prasadana (blood purifying agent) and hridya (cardio protective) properties in nature.

It also contains Haritaki (*Terminalia chebula*), Bibhitaki (*Terminalia bellirica* and Amalaki (*Emblica officinalis*), the three ingredients that make up Triphala choornam, and they are all high in flavonoids, tannins, and polyphenols. Their individual antioxidant and anti-diabetic potential has been widely researched. An inadequate insulin secretion system or insulin resistance causes increased blood glucose levels and metabolic abnormalities.⁶ Because of metabolic disruptions, cells often use stored fats and oils for energy production, drastically altering body weight. Recent researches reveal that Triphala-treated rats displayed a noticeably lower plasma glucose level.⁷

Ela (*Elettaria cardamomum*) also contains a rich amount of flavonoids, sterols, saponins and tannins. The antioxidant action helps reduce endothelium-dependent vasodilation and proves effective in correcting many micro and macrovascular complications of diabetes.⁸

Pippali (*Piper longum*) includes a variety of substances, including volatile oil, alkaloids, isobutylamides, lignans, and esters. Fruit's primary ingredient, piperine, is thought to have potent anti-inflammatory properties.⁹

Tvak (*Cinnamomum zeylanicum*), according to studies, has a potentiating impact on insulin resulting in a dose-dependent decrease in the serum insulin concentration.¹⁰

The drugs in Guggulupanchapalam can improve jatharagni because of their deepana and pachana effects. Due to the correction of jatharagni and the elimination of srothorodha, vitiated doshas became normal. Using the formulation's ushna, deepana, chedana, and lekhana qualities, vitiated Kapha in the srothas is eliminated, causing the outflow of metabolic wastes.^{11,12} This prevents future vitiation of the srothas, resulting in healthy dhatu circulation.

CONCLUSION

Patients with T2DM are more vulnerable to several types of immediate and long-term consequences. The complications are depicted as macrovascular disorders (hypertension, hyperlipidemia, heart attacks, coronary artery disease, strokes, cerebral vascular disease, and peripheral vascular disease), microvascular diseases (retinopathy, nephropathy, and neuropathy), and malignancies.

The formulation's ruksha, teeksha and medohara properties help alleviate the bahu drava shleshma and the abadha medas. It also activates the dormant cells of the islet of Langerhans, which can be compared to the pittadhara kala, which is responsible for insulin regulation in our body. Based upon the various research studies conducted, it is evident that the formulation consists of ingredients with anti-inflammatory, antioxidant and antimicrobial properties which help prevent atherosclerotic plaque formation and reduce the various micro and macrovascular complications. Hence detailed study on Guggulupanchapala choornam is needed as it may prove helpful in managing the various challenges faced by physicians in dealing with diabetes.

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