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Review Article

ANTIDIABETIC PROPERTIES OF *CHANDRAPRABHA VATI*

Sakshi Bhardwaj[1]*, Shailza Bhatnagar[2], Kalpana Yadav[3], Pankaj Yogi[1], Pooja Yadav[1], Deepak Jangidh[1], Ambika[1]

*[1]MD Scholar, [2]Associate Professor, [3]PhD Scholar, Dept. of Samhita evam Maulik Siddhant, NIA, Jaipur, Rajasthan.

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ABSTRACT

Diabetes mellitus is a group of metabolic disorders characterized by elevated blood glucose levels and symptoms like polyuria, polydipsia and polyphagia. It arises from insufficient insulin secretion, insulin resistance, or both. Ayurveda mentions this disease as *Prameha. Chandraprabha vati* is an effective formulation widely used in its management. It is an Ayurvedic formulation available in classical *Vati* form. The indications of *Chandraprabha vati* include *Prameha* and its complications like *Vibandha* (constipation), *Anaha* (distension of abdomen due to obstruction to passage of urine and stools), *Kustha* (diseases of skin), *Netra roga* (eye disorder) etc. It contains 37 herbomineral ingredients which exhibit various actions. The *Rasayana, Vrishya, Shothhara, Deepana paachana* and *Vatanulomana karma* are present in this formulation which makes it a drug of choice in chronic cases of *Prameha* as add on therapy to regular treatment. All the ingredients possess anti-diabetic activity. The article discusses about its role in the management of *Prameha* in detail.

INTRODUCTION

Diabetes mellitus has become a primary health concern these days. It is a metabolic disease characterized by hyperglycemia which occurs due to impairment in insulin secretion, functioning or both. In Ayurveda it is correlated with *Prameha*. *Prameha* is primarily viewed as a lifestyle related disorder. Key contributing factors in the *Prameha* are unhealthy eating pattern and sedentary lifestyle. *Prameha* is associated with the depletion of *Dhatu* (bodily tissues) ultimately leading to depletion of *Ojas* (vital energy and immunity)[1]. *Rasayana* therapy is essential for rejuvenating tissues, replenishing *Ojas*, balancing *Doshas*, enhancing metabolism, preventing complications, and improving mental health. By incorporating *Rasayana* into the treatment plan of *Prameha*, patients can achieve better quality of life. Ayurveda and other traditional systems of medicines describe number of formulations for treatment of diabetes. Many herbal formulations are being evaluated for their effectiveness in controlling diabetes. *Chandraprabha vati* is one of such formulations which can be used as a rejuvenating agent in *Prameha*.

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Objective

To review anti-diabetic properties of each content of *Chandraprabha vati*.

Scientific review of *Chandraparabha vati*

A. Review as per Ayurveda

Chandraprabha vati is mentioned in the *Madhyam Khand* of *Sharangdhar Samhita* in the context of *Vati*. Different *Acharyas* have mentioned different number of contents for the formation of *Chandraprabha Vati*. *Acharya Sharangdhara* has described 36 *Dravya* in *Chandraprabha Vati*. The contents are listed in table no 1. Its indications are *Vibandha* (constipation), *Anaha* (distension of abdomen due to obstruction to passage of urine and stools), *Shula* (colicky Pain), *Granthi* (cyst), *Pandu* (anemia), *Kamala* (jaundice), *Mutrakricchra* (dysuria), *Ashmari* (calculus), *Arsha* (hemorrhoids), *Arbuda* (tumor), *Mutraghata* (urinary obstruction), *Antra-Vriddhi* (hernia), *Kati Shula* (lower backache), *Kustha* (diseases of skin), *Kandu* (itching), *Plihodara* (disorder of spleen, ascites associated with splenomegaly), *Bhagandara* (fistula in ano), *Dantoroga*

(dental disease), *Netra Roga* (eye disorder), *Aruchi* (tastelessness), *Mandagni* (impaired digestive fire), *Striroga* (gynaecological disorders), *Artava Ruja* (dysmenorrhoea), *Shukra Dosha* (vitiation of semen), *Daurbalya* (weakness) and *Prameha*[2].

Properties and actions of contents of *Chandraprabha vati* in the perview of Ayurveda

Table 1: *Chandraprabha vati* ingredients, their properties[3] and actions[4]

S.No.	Drug name	Usable Part	*Rasa*	*Guna*	*Virya*	*Vipak*	Action
1.	*Chandraprabha (Cinnamomum camphora)*	Sublimated extract	*Tiktaa, Katu, Madhur*	*Laghu, Tikshna*	*Shita*	*Katu*	*Vata Kaphahara, Deepan, Vrishya, Lekhana, Dahaprashman, Ruchya, Uttejaka*
2.	*Vacha (Acorus calamus)*	Rhizome	*Katu, Tiktaa*	*Laghu, Tikshan*	*Ushna*	*Katu*	*Kapha nissaraka, vaatanulomaka, deepana, pachana, Vibandhahara, Adhmanhara, Shulhara, Mala-Mootravishodhaka, Lekhana*
3.	*Musta (Cyperus scariosus)*	Rhizome	*Tikta, Katu, Kashya*	*Laghu, Ruksha*	*Shita*	*Katu*	*Deepan, Pachan, Vaatanulomaka, Kaphaghna, Trishnanigrahan, Kandughna, Balya*
4.	*Kirattikta (Swertiya chirayita)*	Plant	*Tikta*	*Laghu, Ruksha*	*Ushna*	*Katu*	*Deepan, Pachan, Virechan, Dahaghna, Pittavirechaka, Shothaghna*
5.	*Guduchi (Tinospora cardifolia)*	Stem	*Tikta, Kashaya*	*Guru, Snigdha*	*Ushna*	*madhura*	*Tridoshaghna, Rasayana, Balya, Jwarhara, Deepan, Mutrajanan, Twakroghara, Pramehahara*
6.	*Devdaru (Cedrus deodaru)*	Heart Wood	*Tikta*	*Laghu, Snigdha*	*Ushna*	*Katu*	*Swedjanan, Mutrajanan, Vaatanulomaka, Vata-kaphahara Twagdoshahara, Vibandhhara, Adhmanhara, Tandranigraha, Pramehaghna, Kaphaghna*
7.	*Haridra (Curcuma longa)*	Rhizome	*Tikta, Katu*	*Ruksha, Laghu*	*Ushna*	*katu*	*Twakdoshhara, Deepan, Kaphaghna, Vaathara, Prameha Nashaka*
8.	*Ativisha (Aconitum hetrophyllum)*	Root Tuber	*Tikta, Katu*	*Laghu, Ruksha*	*Ushna*	*Katu*	*Deepan-Pachan, Balya, Pittashamak, Lekhan, Shothaghna*
9.	*Daruharidra (Berberis aristats)*	Stem	*Tikta, Kashaya*	*Laghu, Ruksha*	*Ushna*	*Katu*	*Balya, Deepan, Pachan, Shleshmaghna, Rasayana, Twak doshhara*
10.	*Pippalimula (Piper longum)*	Root	*Katu*	*Laghu, Snigdha, Tikshna*	*Anush nshita*	*Madhura*	*Rasayana, Deepan- Pachan, Vaathara, Kaphaghna, Agnimandyahara, Uttejaka, Bhedaka, Anulomaka*
11.	*Chitraka (Plumbago zeylanica)*	Root	*Katu*	*Laghu, Ruksha, Tikshna*	*Ushna*	*Katu*	*Agideepak, Rasayana, Vata-Kaphahara, Lekhan*
12.	*Dhanyaka (Coriandrum sativum)*	Fruit	*Kashaya, Tikta, Madhura, Katu*	*Laghu, Snigdha*	*Ushna*	*Madhura*	*Deepan-Pachan, Vatanulomaka, Pipasaghna, Virechaka, useful in Netra Roga, Rochak, Dahaprashman*

13.	*Haritaki (Terminalia chebula)*	Pulp	*Kashaya prdhan panch rasa lavanvarjit*	*Laghu, Ruksha*	*Ushna*	*Madhura*	Excellent *Mridu Virechaka,* useful in *Netraroga and Ajeerna, Vranropaka, Rasayana, Balya, Deepan-Pachan*
14.	*Bibhitaka (Terminaliya bellirica)*	Pulp	*Kashaya*	*Laghu, Ruksha*	*Ushna*	*madhura*	*Virechaka, Vednasthapaka, Shothaghna, Kandughna, Dhatuvardhak, Deepan-Pachan, Anuloman*
15.	*Amalaki (Embelika officinalis)*	Pulp	*Amal prdhan panch rasa lavan varjit*	*Guru, Ruksha, Shita*	*Shita*	*madhura*	*Rasayana, Vrishya, Mridu-Virechak, Deepan, Pramehaghna, Deepan, Dahaprashman*
16.	*Cavya (Piper retrofractum)*	Stem	*Katu*	*Laghu, Ruksha*	*Ushna*	*katu*	*Deepan-Pachan*
17.	*Vidanga (Embelia ribes)*	Fruit	*Katu, Kashaya*	*Laghu, Ruksha, Tikshna*	*Ushna*	*Katu*	*Shoolaghna, Aadhmanhara, Balya, Deepan-Pachan, Anuloman, Rasayana, Vaat-kaphahara*
18.	*Gajapippali (Scindapsus officinalis),*	Fruit	*Katu*	*Laghu, Snigdha, Tikshna*	*Anushn ashita*	*Madhura*	
19.	*Shunthi (Zingiber officinale)*	Rhizome	*Katu*	*Laghu, Snigdha*	*Ushna*	*Madhura*	*Bhedan, Agnideepan, Ruchi, Dahaprashman, Shothahara, Vednasthapan, Vaatanuloman, Kaphaghna, Vrishya, Balya*
20.	*Marica (Piper nigrum)*	Fruit	*Katu*	*Laghu, Tikshan*	*Ushna*	*Katu*	*Agnideepan, Vaatshamaka, Chedan, Ruchya, Lekhana, Medohara, Uttejaka*
21.	*Pippali (Piper longum*	Fruit	*Katu*	*Laghu, Snigdha, Tikshna*	*Anusha nshita*	*Madhura*	*Agnideepan, Vrishya, Rasayana, Rechaka, Pachaka, Ajeernahara*
22.	*Makshika Dhatu bhasma*	Calx	*Amla, Kashaya, Lavan*	*Laghu*	*Shita*	*Katu*	*Bastiruk prashaman, Mehnashan, Shothhara, Tridoshhara, Vrishya, Rasayana*
23.	*Yava kshara*	-	*Katu*	*Laghu, Snigdha, Sukshma*	*Shita*	*Katu*	*Agnideepan, Shoolhara, BVaathara, Shleshmahara, Anahhara*
24.	*Sarji kshara*		*Katu*	*Laghu, Snigdha, Sukshma*	*Shita*	*Katu*	*Shoolhara*
25.	*Saindhava lavana*	-	*Lavana*	*Laghu, Snigdha, Sukshma*	*Shita*	*Madhura*	*Deepan-Pachan, Ruchya, Vrishya*
26.	*Sauvarcala lavana*	-	*Lavana*	*Laghu, Ruksha, Tikshna, Vyavayi*	*Ushna*	*Madhura*	*Ruchya, Bhedana, Deepan-Pachan, Vibandhahara, Sulaghna, Vaatanulomaka*
27.	*Vida lavana*	-	*Lavana*	*Laghu, Sukshma*	*Ushna*	*Madhura*	*Deepan, Ruchya, Vyavaayi, Vibandhanashaka, Vaatanulomaka, Shoolaghna*
28.	*Trivrit (Operculina*	Root	*Tikta, katu*	*Laghu, Ruksh,*	*Ushna*	*Katu*	*Bhedan, Virechaka, Shothaghna, Vaatshamaka*

	turpethum),			*Tikshan*			
29.	*Danti (Baliospermum montanum),*	Root	*Katu*	*Guru, Tikshan*	*Ushna*	*Katu*	*Sara, agnideepan, dahahara, rechan, Adhmanhara, Shothaghna*
30.	*Patraka (Cinnamomom tamala)*	Leaf	*Katu, Tikta, madhura*	*Laghu, Ruksha, Tikshna*	*Ushna*	*Katu*	*Deepan, Ruchya, Kapha-Vaatahara*
31.	*Tvak (Cinnamomum verum)*	Stem Bark	*Katu, Tikta, madhura*	*Laghu, Ruksha, Tikshna*	*Ushna*	*Katu*	*Deepan-Pachan, Uttejaka, Anuloman, Trishnanigrahan, Balya*
32.	*Ela (Elettaria cArdamom)*	Stem	*Katu, Madhura*	*Laghu, Ruksha*	*Shita*	*Madhura*	*Trishnanigraha, Deepan-Pachan, Ruchya, Vaatanulomaka, Uttejaka*
33.	*Vaṃśarocana (Bambusa arundinance)*	Silicacious Concretion	*Madhura, Kashaya*	*Ruksha, Laghu, Tikshna*	*Shita*	*Madhura*	*Chedana, Bastishodhaka, Shothaghna*
34.	*Hata loha*	Calx	*Tikta*	*Guru, Ruksha, Sara*	*Shita*	*Madhura*	*Medohara, Mehahara, Shothhara, Kaphapittaghna,*
35.	*Sita*	Crytaline Sugar	*Madhura*	*Guru, Snigdha*	*Shita*	*Madhura*	*Ruchya, Vaata-Pitta hara, Dahahara*
36.	*Silajatu,*	Sublimated extract	*Tikta, Lavana*	*Laghu, Tikshna*	*Shita*	*Katu*	*Rasayana, Chedana, Kapha-Medshamaka, Shothhara, Udardoshhara*
37.	*Guggulu (Commiphora mukula)*	Exudate	*Tikta, katu*	*Laghu, Ruksha, Tikshna, Vishada, SukshmaSara, Sugandhit*	*Ushna*	*Katu*	*Tridoshaghna, Rasayana, Balya, Vrishya, Deepan, Shothhara, Vaatanuloman, Vednasthapan*

Method of preparation[2]

The *Churna Dravyas* are powdered and mixed well. In a vessel filled with warm water *Shudha Shilajatu*, *Shudha Guggulu* are added and melted. When it gets cooled above powdered drugs are added and fine bolus is formed. Afterwards rest of *Bhasma Dravya* along with *Sharkara* is added. Adding little warm water a fine mixture is made and the pills are rolled and kept in shade for drying.

Anti-diabetic properties actions of contents of *Chandraprabha vati*

***Chandraprabha (Karpura)* (Cinnamomum Camphora)-** Camphor is a natural product of the *Cinnamomum camphora,* used in general to control excessive sweating and burning sensation of skin. It has scraping property, useful in balancing *Kapha*[5]. A study on Diabetic rats shows suggests that its antihyperglycemic properties are likely attributed to its antioxidant effects[6]. It exhibited inhibitory activities for α-amylase and α-glucosidase assays which are helpful for starch breakdown into glucose. It helps in pancreatic β-cell restoration and insulin secretion also[7].

***Vaca* (*Acorus Calamus*)-** It increase levels of plasma insulin, tissue glycogen, and G6PD. Ethyl acetate extracted from *Vacha* increases Secretion of GLP-1 and lowers blood glucose levels. It also enhanced insulin secretion in HIT-T15 cells and blocked the α-glucosidase in vitro activity[8]. Treatment with β-asarone in obese rats resulted in weight loss and also inhibited metabolic changes, glucose intolerance, elevated cholesterol levels, and variations in adipokine levels[9]. The in vitro antioxidant activity of acetone, acetonitrile, alcoholic, and aqueous extracts exhibited free radical scavenging activity.[10]

Nagarmotha (Cyperus Scariosus)- Anti-hyperglycemic activities are reported in the leaves of this plant[11]. The active constituents of root extracts and volatile oil include sesquiterpenes, cyperone, selinene, and cyperene which exhibit various pharmacological properties such as antioxidant, and antihyperglycemic activities[12]. Gallic acid, quercetin,

and 4-hydroxycinnamic acid has significant anti-diabetic and radical scavenging activities.[13,14]

Bhūnimba (Kiratatikta)- Ethanolic root extract showed a significant anti-diabetic effect, with a notable decrease in blood sugar levels. It significantly reduced cholesterol and lipid levels. Mangiferin, in particular, is recognized for its blood glucose-lowering properties[15]. The anti-diabetic activity was evaluated by assessing the inhibitory effect on the enzyme α-amylase, which is involved in the breakdown of starch to produce glucose[16].

Guduchi (Tinospora Cardifolia)(Amritaa)- It has been reported to mediate its anti-diabetic potential through various biologically active phytoconstituents isolated from different parts of plant, including alkaloids, tannins, cardiac glycosides, flavanoids, saponins and steroids. The isoquinoline alkaloid rich fraction from stem, includes palmatine, jatrorrhizine, and magnoflorine which have been reported for insulin mimicking and insulin releasing effect both *in vitro* and *in vivo*. By adenosine monophosphate-activated protein kinase activation, it decreases the blood sugar and cholesterol level and maintains the blood pressure.[17].

Daruka (Devadaru) (Cedrus Deodaru)- *C.deodara* possesses strong antioxidant properties[18]. The ethanolic extract has an anti-hyperglycemic effect in rats with streptozotocin-induced diabetes along with reduction SGPT, SGOT, cholesterol, and triglycerides. Histopathological studies revealed that it enhanced islet regeneration in the pancreas and restored normal cellular size of the islets with hyperplasia[19]. In in-vivo experiments, capsules made from the plant's wood extract have shown significant anti-diabetic properties[20].

Haridra (Curcuma Longa)- It can delay the development of type 2 diabetes, enhance β-cell function, prevent β-cell death, and reduce insulin resistance in animal studies[21]. A 9-month treatment with curcumin extract can effectively and safely prevent the progression from prediabetes to type 2 diabetes[22]. The main constituents Curcumin, Dimethoxy Curcumin, Bis-demethoxy Curcumin, and Arturmerone exhibit PPAR-γ ligand binding activity, enhancing the transcription of several insulin-responsive genes and improving insulin resistance in type 2 diabetes mellitus[23].

Ativisha (Aconitum Hetrophyllum)- Oral administration of A. heterophyllum extract in diet-induced obese rats significantly reduced serum total cholesterol, triglycerides, and LDL cholesterol levels, and inhibited intestinal fat absorption. Its extract possesses potential hypolipidemic[24] and anti-obesity activities[25].

Darvi (Berberis Aristats)- A systematic study conducted on the roots of *Berberis aristata* indicates that both aqueous and methanolic root extracts exhibit a hypoglycemic effect when administered to normal and alloxan-induced diabetic albino rabbits and Wistar rats by stimulating insulin production[26].

Pipplimūla (Pippali) (Piper Longum)- It was found that the oral administration of ethanolic extract restores the blood glucose level which ultimately stimulates the liver activities to maintain the normal homeostasis of blood glucose level[27]. Aqueous extract also showed significant antidiabetic properties[28]. Another study showed that the oral administration of the dried fruits showed antioxidant, anti-lipid peroxidative and antihyperglycemic activities in diabetic rats when compared with standard reference drug glibenclamide[29].

Chitraka (Plumbago Zeylanica)- Plumbagin increased the activity of hexokinase and decreased the activities of glucose-6-phosphatase and fructose-1, 6-bisphosphatase significantly in treated diabetic rats. Enhanced GLUT4 mRNA and protein expression were observed in diabetic rats after treatment with plumbagin[30]. Extracts of Plumbago zeylanica show a significant in-vitro inhibitory effect on α glucosidase[31].

Dhanyaka (Coriandrum sativum)- The ethanolic extract of coriander leaves had the antidiabetic activity by improving and regenerating the β cell in pancreas and inhibiting the α-glucosidase enzyme in small intestine[32]. The anti-diabetic activity of *Coriandrum sativum* seeds was studied by incorporating the seeds into the diet of rats fed a high-fat diet with added cholesterol. The administration of coriander seeds had a significant hypolipidemic effect. The levels of low-density lipoprotein (LDL) and very low-density lipoprotein (VLDL) cholesterol decreased, while high-density lipoprotein (HDL) cholesterol levels increased in the experimental group compared to the control group. The increased plasma LCAT activity and enhanced degradation of cholesterol to fecal bile acids and neutral sterols were likely responsible for the hypocholesterolemic effect[33].

Haritaki (Terminalia Chebula)- Alcoholic extract of *Terminalia chebula* induced efficient anti-hyper-lipidemic property[34]. Oral administration of the water extract of *T. chebula* improved glucose utilization during a glucose tolerance test (GTT), Similarly, the extract reduced fasting blood glucose (FBG) to near-normal levels within two weeks[35].

Bibhitaka (Terminaliya bellirica)- Continuous administration of a dried 75% methanolic extract significantly prevented hyperglycemia in alloxan-induced hyperglycemia. Similarly there was significant

increase in the activity of catalase and glutathione in blood and liver[36].

Amalaki(Embelika officinalis)- It have some important constituents (including gallic acid, gallotanin, ellagic acid and corilagin), possess anti-diabetic effects through their antioxidant and free radical scavenging properties. It has also been reported to prevent/reduce hyperglycemia, diabetic nephropathy and neuropathy[37].

Vidanga(Embelia Ribes)- The ethanolic extract reduces serum leptin, adiponectin, lipase, hepatic glycogen content, and glucose-6-phosphatase levels towards normal in diabetic rats[38]. These findings suggest that ER extract has the potential to prevent lipid abnormalities and pancreatic β-cell dysfunction in type-2 diabetes mellitus (DM). *Embelin* was found to induce PPARγ (a key molecular target for treating type-2 DM, is down-regulated during tissue insulin resistance) expression in the epididymal adipose tissue of diabetic rats[39]. A case study stated on the efficacy of *Vidangadi Kwatha* on patients of type 2 diabetes mellitus[40].

Gajapippali (Scindapsus Officinalis)

The water extract demonstrated strong antidiabetic activities, significantly enhancing glucose consumption in insulin-resistant HepG2 cells compared to the model group[41].

Shunthi (Zingiber Officinale)- Treatment with *Zingiber officinale* significantly increased insulin levels and decreased fasting glucose levels in diabetic rats. Additionally, it lowered serum cholesterol, serum triglycerides, in diabetic rats. It potentially involves 5-HT receptors[42].

Marica (Piper nigrum)- Research indicates that *Piper nigrum* exerts a protective effect in alloxan-induced diabetic rats, helping to reduce glucose levels.[43] It was observed in one study that nine out of twenty novel piperine analogues (5b, 6a-h) exhibited significantly higher antidiabetic activity compared to the standard drug, rosiglitazone[44].

Pippali (Piper Longum)- thanolic extract of dried Piper longum fruits possesses potent antihyperglycemic and antilipidperoxidative activities in alloxan-induced diabetes[45]. Aqueous extract on STZ-induced diabetic rats resulted in a significant decrease in fasting blood glucose (FBG) levels and correction of diabetic dyslipidemia.

Trivrit (Operculina Turpethum)- Its flavoured fraction primarily functions as an alpha-amylase inhibitor and an agonist for PPAR gamma, underscoring its potential role in the management of type 2 diabetes mellitus as an antihyperglycaemic[46].

Danti (Baliospermum Montanum)- Its extract demonstrated significant effects in reducing blood glucose levels and lipoproteins in diabetic animals. Traditionally, *Baliospermum montanum is* used as a diaphoretic, promoting the elimination of body fluids through the skin. Its active constituents include flavonoids, both of which contribute to its efficacy in treating diabetic nephropathy[47].

Patraka (Cinnamomom Tamala)- In a study evaluating the ethanolic extract of *C. tamala* leaves, exhibited both hypoglycemic and antihyperglycemic properties in normoglycemic (and STZ-hyperglycemic rats.[48,49] Its ethanolic extract prevented the rise in total cholesterol (TC), triglycerides (TG), low-density lipoprotein (LDL), and very-low-density lipoprotein (VLDL) cholesterol levels, indicating its beneficial effects on STZ-induced hyperlipidemia.[50]

Ela (Sukshmaila)- In a clinical trial, carried out on obese or overweight pre-diabetic women (3 gm cardamom for 2 months) disclosed that Total Cholestrol and LDL-C significantly reduced. It also showed a protective effect on HDL-C amount in pre-diabetic subjects.[51] Cardamom has been shown to control certain inflammatory and oxidative stress parameters in pre-diabetic people.[52] The administration of cardamom caused an increase in SIRT1 (Sirtuin 1) in the non-alcoholic fatty liver patient[53]. It was also found that administration of cardamom powder prevented obesity in high-fat diet-induced obese rats[54]. Cardamom can ameliorate high blood glucose, insulin resistance, and glucose metabolic disorders. E. cardamomum and its active constituents can control insulin secretion, insulin resistance through increasing the amount of SIRT1, PPAR-γ coactivator-1 alpha (PGC-1α), and attenuating the function of nuclear factor kappa-light-chain-enhancer of activated B cells (NF-κB) as well as controlling glucose metabolism by inhibiting α-glucosidase and α-amylase[55].

Vamsharocana (Bambusa Arundina)- Aqueous ethanolic seed extract has shown maximum reduction in blood glucose level. The significant antidiabetic activity of these seeds may be attributed to their ability to inhibit free radical generation and prevent subsequent tissue damage caused by alloxan. Additionally, these seeds may enhance the effect of plasma insulin by either stimulating the pancreatic secretion of insulin from existing beta cells or promoting its release. This is evidenced by the significant improvement in glucose and protein levels, as insulin inhibits gluconeogenesis from proteins[56].

Guggulu (Commiphora Mukula)- In an experimental model of diabetes, *C. mukul* and *P. emblica* dramatically increased DPP-IV levels. The medicinal herbs' DPP-IV

inhibitory activity also translated into considerable antidiabetic efficacy, as seen by a considerable reduction in HBA1C levels[57]. Docking experiments against DPP-IV revealed that the active compounds in *C. mukul* (Gluggusterone E, Gluggusterone Z) have considerable inhibitory activity against the enzyme (DPP-IV)[58]. The hypolipidemic activity was shown in animals as well as in patients of obesity and hypercholesterolemia[59]. It contains Z-guggulsterones and E-guggulsterones which are purported to be the compounds responsible for the hypoglycaemic and hypolipidemic activity of the *Guggulu*.[60]

DISCUSSION

Chandraprabha Vati is an excellent formulation whose ingredients have undergone various in vivo and clinical studies, demonstrating significant anti-diabetic effects. The formulation contains a wide array of potent herbs and substances, each contributing unique therapeutic properties. For analgesic effects, *Vacha*, *Vidanga, Sarjika kshara*, *Sauvarcala lavana*, *Vida lavana*, and *Yava kshara* are included. *Rasayana* agents like *Guduchi*, *Haritaki* and others offer vital support in promoting overall health. *Deepana* and *Pachan* actions are enhanced by herbs such as *Musta Kirattikta* and *Haritaki.* Carminative effects are provided by *Vacha*, *Musta*, and *Pippalimula*, while *Kaphaghna* drugs like *Haridra* and *Devdaru* reduce excess *Kapha*. *Shothaghna* properties are ensured by *Kirattikta* and *Ativisha* among others. For skin disorders *Haridra* and *Daruharidra* are included. *Jwarahara* benefits are provided by *Guduchi*, while *Shothhara* effects are supported by *Devdaru* and *Guggulu*. Anti-diabetic (*Pramehaghna*) properties come from *Guduchi*, *Haridra*, and *Amalaki*. The formulation also includes anti-obesity *Medohara* agents like *Marica* and *Shilajatu*, as well as *Chedana* drugs like *Shilajatu* and *Vamsarochana. Tridoshaghna* herbs like *Guduchi* and *Guggulu* balance all three doshas, while *Lekhana* and *Vyavaayi* actions are supported by ingredients like *Vacha*, *Ativisha*, and *Vida lavana*. This comprehensive blend ensures a holistic approach to managing various health conditions, particularly *Prameha*. Despite its long history of use and the known anti-diabetic and lipid-lowering properties of its components, systematic scientific studies are still needed to fully validate its therapeutic utility in controlling diabetes. *Chandraprabha vati's* ingredients offer various benefits.

CONCLUSION

Diabetes mellitus, a chronic metabolic disease leads to damage in various body systems, causing complications that worsen the diabetic state and impact the quality of life. The ingredients of this formulation have demonstrated significant anti-diabetic effects in various studies. The properties mentioned above play a crucial role in managing and controlling *Prameha*.

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***Address for correspondence**
Dr. Sakshi Bhardwaj
MD Scholar,
Dept. of Samhita evam Maulik Siddhant, NIA, Jaipur,
Email:
drayurvedonline@gmail.com