



Case Study

EFFECT OF MUDGADI KASHAYA PEYA AND SELECTED YOGA TECHNIQUES IN PREDIABETES

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ABSTRACT

Prediabetes, an intermediate state of hyperglycemia is the precursor stage of type 2 diabetes mellitus. Prediabetes and diabetes has been emerged as a major challenging health problem worldwide due to their high mortality and morbidity rates. Sedentary lifestyle, unhealthy diet, physical inactivity, mental stress associated with urbanisation contributes the increasing prevalence of prediabetes and diabetes. Since type 2 diabetes and their complications results in poor quality of life and significant economic burden to family and society due to the increased medical expenditure and loss of productivity, an effective intervention is required. Lifestyle interventions comprising a healthy diet, and physical activity in the prediabetic stage will be a best measure to halt the further progression in to type 2 diabetes. In this study an Ayurvedic diet, *Mudgadi Kashaya peya* and selected *yoga* techniques were given for a period of 90 days to evaluate their effect in prediabetes. Statistical analysis of the data obtained revealed that *Mudgadi Kashaya peya* and selected *yoga* techniques has significant affects in reduction of FBS, PPBS, HbA1c and Total Cholesterol values.

INTRODUCTION

The world is facing a growing health crisis: the rise of Non-Communicable Diseases (NCDs). Among the four main types of NCDs- diabetes stands out as a particularly pervasive and debilitating condition. According to IDF Atlas in 2021, the top three nations with the highest number of people with diabetes are China (1401.9million), India (74.2 million), and Pakistan (33.0 million) and in India it is expected to rise over 134 million by 2045^[1]. According to WHO reports, diabetes ranks 5th leading cause of mortality worldwide^[2]. This condition remains undetected for many years as 90% of the cases are asymptomatic. Moreover, the precursor to diabetes, prediabetes affects millions more, often going undetected until it is too late. Prediabetes is a significant public health concern characterized by elevated blood glucose levels that are above normal but not yet enough to be classified as high type 2 diabetes.

This condition is a warning sign for individuals who are at increased risk of developing diabetes. Prevalence of prediabetes may vary according to the different criteria used, such as age, ethnicity, family history, physical inactivity etc. As per the estimates available, over 470 million peoples are expected to have prediabetes by 2030^[3]. Sedentary lifestyle, unhealthy diet, increased use of tobacco and alcohol consumption, psychological factors like stress, are the major risk factors responsible for their rising trends globally. This is due to the sudden shift in the life styles as a result of the development in technologies associated with industrialisation and urbanisation.

The risk of developing diabetes is associated with modifiable and non-modifiable factors. Increase in prevalence is most probably due to modifiable risk factors. Since prediabetes is a reversible condition, modifying the risk factors through life style intervention has been considered as the corner stone in the prevention of type 2 diabetes. Lifestyle modification mainly focuses on weight reduction through a healthy low-calorie diet and increased physical activity. Kerala has now referred as 'Diabetes Capital of India' due to their high intake of traditional high carbohydrate diet, red meat, junk foods, less physical activity, high incidence of family history,

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ageing of population and good access to health care. Apart from impacting quality of life, prediabetes also places a considerable burden on a nation's economy due to its increased medical cost and less productivity.

In Ayurveda, concepts of diabetes are similar with *Prameha roga*. It is also manifested as a result of *Aaharaviharas* which increases *Kapha*, *Medas* and *Mutra* and a sedentary life style. In Charaka samhitha *Prameha nidana*, role of diet in diabetic susceptible persons and prevention of diabetes is clearly mentioned. Treatment of disease in Ayurveda is through *Oushadha* and *Ahara*. *Pathyaannakalpanas* are unique type of dietic preparations only described in Ayurveda Samhithas. *Peya* is one among the *pathyakalpanas* which is *Deepana Pachani* and *Mala anulomani* as per Ashtanga Hridaya^[4]. Yoga a holistic practice promotes physical, mental and spiritual well-being.

This study aims at cost effective lifestyle management of blood glucose level at the prediabetic stage through an Ayurvedic diet *Mudgadi Kashaya peya* along with selected yoga techniques. *Mudgadi Kashaya peya* is mentioned in the *Sthoulya chikitsa* of *Chikitsamanjari* and *Yogamrutham* for *Sthoulya* and *Prameha roga*^[5]. This *Peya* consists of three ingredients *Mudga*, *Laja* which are specifically mentioned under *Pathyas* of *Prameha* and *Khadira* which is having *Prameha samana* property^[5]. *Mudga* and *Laja* are prepared in *Khadira kasaya* as per *Peya kalpana*. Selected *Yoga* protocol provides physical exertion to the body, reduces the insulin resistance, enhances insulin production, regulates and improve the metabolic function. Since stress also have a major contribution to the onset and progression of the diabetes, *Pranayamas* and deep relaxation techniques helps in reducing the secretion of glucagon, a hormone released during stress that increases blood sugar level. Hence this therapeutic dietary formulation having anti-diabetic property and good nutritional value together with *Yoga* can make a significant impact on blood glucose level, pancreatic function and stress.

AIMS AND OBJECTIVES

OBSERVATION AND RESULTS

Table 1: Difference of FBS with Time

FBS	N	Mean	Std. Deviation	F	p Value
0 th day	32	116.09	3.373	527.2	<0.0001
31 st day	32	109	4.219		
61 st day	32	100.03	5.196		
91 st day	32	91	6.283		

There was significant reduction in FBS value with an average of 25.09mg/dl during the 90 days of study period.

AIM

To evaluate the effect of *Mudgadi Kashaya peya* along with selected *yoga* techniques in prediabetes.

OBJECTIVES

Primary objective

To study the effect of *Mudgadi Kashaya peya* and selected *yoga* techniques on FBS, PPBS and HbA1c.

Secondary objective

1. To study the effect of *Mudgadi Kashaya peya* and selected *yoga* techniques on total cholesterol level.
2. To find the percentage of people who are at risk for having diabetes among the participants selected for study using Indian Diabetic Risk Score

METHODOLOGY

This study was conducted in the OPD of Govt. Ayurveda College, Tripunithura, among 32 participants including both sexes between the age group of 30-45 years. The participants were selected as per the inclusion and exclusion criteria. These participants were advised to take *Mudgadi Kashaya Peya* at 7 pm as dinner and 45 minutes of *Yoga* practice during morning time for a period of 90 days. Before the actual *Yoga* session for study starts, subjects were given 7 days training to familiarise the *Yoga* techniques according to the *Yoga* schedule. FBS and PPBS were assessed on 0th day, 31st day, 61st day and 91st day. HbA1C and Total cholesterol were assessed on 0th day and 91st day. The selected *yoga* techniques include loosening exercises, standing-postures: *Ardhakati-chakrasana*, *Parivritta-trikonasana*, Sitting-postures: *Paschimottasana*, *Ardhamatsyendrasana*, *Vajrasana*, supine-postures: *Pavanamuktasana*, Prone-postures: *Bhujangasana*, *Dhanurasana*, *Savasana* followed by *pranayamas* such as *Nadishushi*, *Bhramari* and deep relaxation technique (DRT). This *Peya* is prepared by boiling 24g each of *Laja* and *Mudga* in *Khadira kashaya*. *Khadira kashaya* is freshly prepared by adding 10g fine powder of *Khadira sara* in 800ml of water and boiled for 2 minutes. The data was analysed using repeated measures of ANOVA and Paired t test.

Table 2: Difference of PPBS with Time

PPBS	N	Mean	Std. Deviation	F	p Value
0 th day	32	158.12	6.68	884.6	P<0.0001
31 st day	32	149.31	7.15		
61 st day	32	140.56	7.05		
91 st day	32	134.87	5.58		

An average value of 23.25mg/dl reduction was observed in PPBS, which is statistically significant.

Table 3: Difference of HbA1c with Time

HbA1c	N	Mean	Std. Deviation	t value	p value
Before Intervention	32	5.843	0.134	18.17	<0.0001
After Intervention	32	5.475	0.188		

A statistically significant reduction of 0.368 was observed in HbA1c test after the study period.

Table 4: Difference of Total Cholesterol with Time

HbA1c	N	Mean	Std. Deviation	t value	p value
Before Intervention	32	175.43	28.72	3.804	<0.0001
After Intervention	32	167.28	18.68		

Among the 32 study participants, only 22% had total cholesterol value above the normal range and it is dropped to normal range after the study.

Indian Diabetic Risk Score calculated in the 32 participants shows that 75% of the individuals are at higher risk and 25% are at medium risk for developing into type 2 diabetes in future.

DISCUSSION

Probable mode of action

Prameha is a *Santharpanothaja vyadhi* in which *Tridoshas* are involved along with the vitiation of *Meda* and *Kleda*. Among the *Tridoshas*, *Kapha* is mainly vitiated in the initial stages. Here in prediabetes which is similar to *Apathyanimittaja prameha* which is due to the excessive intake of *Guru*, *Snigdha*, *Pichila*, *Madhura aharas* and impairment in *Kayagni* and *Dhatwagni*, there is formation of *Ama* in the body. Hence diet for prediabetes should include of drugs which can counteract the *Guru*, *Snigdha*, *Pichila guna* of *Kaphamedas-kleda* and should be of *Deepana-pachana* in nature. Considering a diet for prediabetic patient, it should include foods of high fibre, good amount of protein, low GI and GL carbohydrates, and low fat.

Unlike the other *Peyas* which is normally prepared in water, this *Peya* is prepared in the *Kashaya* of *Khadira*, along with two other ingredients *Mudga* (green gram) and *Laja* (puffed rice). Therefore, due to the *Samskara sampannatha* of these *Kapha medohara* drugs, this type of *Peya* didn't increase *Kapha* even though *Peyas* are usually *Kaphavardhaka*. *Peya* itself has the properties such as *Laghu*, *Deepana*, *Pachana* which helps in correcting the *Agni* and improves digestion and thereby clears the obstruction of channels. This helps in pacifying *Ama*. Since *Peya*

contains more amount of water it also provides feeling of fullness and thus helps to avoid excess intake of food during night.

Khadira-a Tikta kashaya rasa, Katu vipaka and *Laghu guna dravya* in the form of *Kashaya* has specially indicated in classics for *Kaphaja prameha chikitsa*^[6]. *Mudga* which is a rich source of plant-based protein and a good source of a fibre especially a soluble fibre-pectin and having low glycemic index makes a good dietary option for prediabetic patient. It also contains minerals like magnesium, calcium, iron and vitamins^[7]. As it contains antioxidants like vitexin and isovitexin it helps in reducing the oxidative stress present in the prediabetic condition. Being a high fibre source, it delays the absorption and prevents sudden fluctuation of glucose in the blood. It is included in *Nithya-Sevaneeya* and *Prameha pathyas ahara*. *Mudga* and *laja* are also *Kashaya* predominant *Madura rasa dravya* with *Laghu-rooksha guna*. As per the classics, *Laja* itself possess *Agni deepana*, *Kaphachida* and *Medohara* property^[8]. *Kashaya* and *Thikta rasa* have the property of *Kapha-kleda-meda shoshana*. *Laghu guna* kindles *jataragni* and corrects *Dhatwagni mandhya* and helps in easy digestion. *Rooksha guna* causes drying up of *Kapha* and *Kleda* which are of *Ap mahabhutha* predominance and also reduces *Medas*. *Laghu-rooksha* and *Katu vipaka* improves *Agni* and thus results in *Srothoshodhana*. Three of these ingredients have *Sheeta virya*. So, this *Peya* pacifies *Kapha-pitta dosha* and may arrest their further progression in to the next level of vitiation. This *Peya* also helps in lowering cholesterol level in the blood as it has *Kapha medohara* property. Since it is advised to take diet in the night time at 7pm, it provides sufficient time for their digestion before sleep and will provide lightness feel

for the body. This helps the individual to get a proper sleep very easily. The early dinner also provides a fasting period of minimum 12 hrs before the next meal. This is equal to the effect of *Langhana* which is also considered as a treatment option that reduces *Kapha* and *Medas* will definitely be an add on effect over the diet and yoga. Hence *Mudgadi Kashaya peya* is a best choice as a nutritional as well as therapeutic diet for prediabetic/diabetic individuals as it contains proteins, fibre, vitamins and minerals.

The *Asanas* included in selected yoga techniques causes stretching and relaxation of the muscles on chest, abdomen and waist regions. The compression on the abdominal region gives a massage effect on the internal organs in the abdominal and pelvic regions. This increases the blood circulation to the internal organs like pancreas and stimulates its secretion. Adipose tissue in the abdominal region which is main cause of central obesity may also get reduced. Thus reduction in fat in those areas may decrease the insulin resistance and promote active glucose uptake by the muscles. Most of the people having prediabetes is associated with irregular or reduced sleep. *Pranayama* and deep relaxation technique (DRT) helps in improving the sleep quality of individual. It reduces the release of stress hormone, cortisol and enhances the production of feel-good hormones like endorphins. It also reduces mental stress, fatigue, muscle tension in the body, and restores the body energy after the yoga asana practice. *Bhramari* soothes the mind and sharpens brain and helps to achieve a calm and peaceful mind^[9].

CONCLUSION

Diet plays a major role in causation of diabetes mellitus. High intake of carbohydrates, saturated and trans-fat, red meat, fried foods, processed food and drinks causes spike in blood sugar level and increase in body weight. Hence eating right food in terms of quantity and quality is helpful in the prevention and management of prediabetes. Mind-body involvement in the yoga practice helps in leading disciplined lifestyle, in eating and exercise. It avoids binge eating, a risk factor for prediabetes and reduces anxiety, depression etc due to stress. This *Peaya* which has the

properties of *Laghu*, *Deepana* and *Kapha-medohara* together with selected yoga techniques was effective in correcting dearranged metabolism in prediabetes. Hence *Mudgadi Kashaya peya* and selected *Yoga* techniques shows significant reduction in the FBS, PPBS HbA1c and total cholesterol level.

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