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## BEHAVIOR MODIFICATION BY EDUCATIONAL INTERVENTIONAL MODULE (EIM) ON PRAMEHA (TYPE 2 DIABETES MELLITUS): A CASE REPORT

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### Abstract

Diabetes is the most prevalent disease of modern era, altered diet and lifestyle stays behind its pathophysiology. Long running hours of busy life compel the person to eat, ready to eat meal or high caloric food. This type of food is highly toxic to the health if consumed frequently. Once the pathophysiology of diabetes get initiated, person started with manifestation of various sign and symptoms and furthermore, associated with complications. As a treatment module, diabetes person has to follow particular diet and lifestyle along with multiple medications, which makes the patient exhausted. But due to improper guidance and education patient fails to cure his disease. That's why in present case, diabetic patient was educated about his disease and also counseled about the healthy and diabetic friendly diet and lifestyle. The purpose behind education was to modify the behavior of the patient towards his disease and how he can manage his disease by himself.

**Keywords:** Diabetic, Premeha, Diet, lifestyle, behavior, education

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### Introduction

According to WHO (2022), Diabetes Mellitus is a chronic, metabolic disorder characterized by raised blood glucose (or blood sugar), which causes various complications in bodily organs i.e heart, blood vessels, eyes, kidneys, and nerves. Type-2 Diabetes Mellitus commonly found in adults is most common, results of insulin resistance or insufficient insulin. Prevalence of type-2 Diabetes Mellitus has been dramatically risen in past three decades. Type-1 diabetes which is also known as juvenile diabetes is a chronic condition in which the pancreas produces little or no insulin by itself. Access to affordable treatment is very critical for diabetic patients for their survival. There is a globally agreed target to halt the rise in diabetes and obesity by 2025. Globally, around 422 million people lives with diabetes, majority of which resides in low-and middle-income countries, and diabetes is counted as the causative factors behind 1.5 million deaths each year. Both the number of cases and the prevalence of diabetes have been steadily increasing over the past few decades. As much as lifestyle factors can increase the risk of type-2 Diabetes Mellitus, they can also reverse or treat the disease. Behavioral

modifications can be directly influences the changes in blood glucose levels. Diabetic patients often feel irritated, anxious, restless, due to restrictive diet and lifestyle. Behavior modification is much needed to educate the patient to adopt a healthy diet and lifestyle. That's why this study is designed to educate pre-diabetic patients to adopt healthy diets and lifestyles. Due to globalization, urbanization & advancement in knowledge & technologies, our lifestyle also has been changing inevitably. The modern era is constantly under threat of developing diseases like hypertension, diabetes, obesity, etc. Our ancestors lived a different kind of life & the health problems they faced were quite different from that of ours nowadays. To attain the health of all by Ayurvedic principles. Ayurveda is complete knowledge about life, how to live life in a healthy way, and how to achieve harmony with nature. Low immune function, persistent infections, persistent inflammation, persistent non-healing wounds, obesity, and other conditions are examples. Lifestyle modification is more efficient mode of management than standard care for type 2 diabetic patients.

### Patient Detail

A 38-year-old male patient came for consultation in Swasthavritta and Yoga outpatient department of All India Institute of Ayurveda, New Delhi, who was apparently healthy 4 months ago, but over the period of last four month suffered from itching in lower limbs, lethargy, Increases in body weight, and fatigue. The patient was taking modern medicine for the itching and got temporary

ease from the treatment but symptoms relapsed after the withdrawal of medicines.

The patient had no past history of type-2 Diabetes Mellitus, thyroid dysfunction, and hypertension. The patient belongs to the IT sector for which he has had to sit continuously for long hours for the last 13 years. The patient was indulge in binge eating and often include junk, ready-to-eat meals, and outside meal which is deep fried and spicy in his diet. The patient had frequent snacking habits for which he consumed Namkeen, chips, Biscuits, and chocolate and consumes soft drinks, and coffees to make himself alert and active throughout the day working on the computer and not doing any kind of physical activity.

### Clinical Examinations

Pateint was diagnosed with type-2 Diabetes Mellitus after blood Investigations conducted in 2021. On thorough clinical examination it was found that patient has *Mandagni* (~weak state of Agni), *Madhyama Bala* (~Medium Strength), and *Pitta Pradhana Kapha Prakriti* (~constitution). *Asthavidha Pariksha* (~ eight measures of examination) *Nadi* (~Pulse) was 89/min, *Mala* (~waste Products) was *Saama Mala* (~ excreta associated with *Ama*), *Mutra* (~ urine) was *Adhikya* (~ increased frequency), *Jivha* (~Tongue) was *Saama* (~ coated), *Shabda* (~Sound)- was Dull and slow, *Sparsha* (~touch) was *Samanya*, *Drik* (~ vision) was *Samanya* and *Akriti* (~form) was *Sthula* (~obese).

### Timeline and Therapeutic Intervention:

Treatment was started with Ayurvedic medicine on 18/05/2022. He was prescribed oral medications [Table 1]. Proper counseling and education of the patient [Table 2] was done, which included education about the disease, its pathophysiology, and the measures that would help in the management of the disease. In-depth information about the *Pathya*(~Wholesome) and *Apathya* (~Unwholesome) diet and lifestyle was advocated to modify the behavior of the patient towards his diseases

and motivate him to adopt diabetic-appropriate behavior [Table 3,4,5].

Table No.1: Oral medications

Duration	Medicine given
May 20, 2022 to June 4, 2022	<i>Shilajativadi Lauha</i> 2tb, 125mg twice a day after lunch and dinner <i>Gudmar Churna</i> (2gm) twice a day before lunch and dinner <i>Amla Churna</i> (2 gm) twice a day before lunch and dinner <i>Haridra Churna</i> (2 gm) twice a day before lunch and dinner <i>Gokshuradi Guggulu</i> 500 mg, twice a day after lunch and dinner
June 5, 2022 to June 18, 2022	<i>Tab Nishamalaki</i> 2 - tab, 500 mg, twice a day before lunch and dinner <i>Pancha Nimba Churna</i> 3 gm mixed with <i>Giloya Sattva</i> 250mg, twice a day, after lunch and dinner <i>Chandra Prabha Vati</i> 2-tab, 500 mg, twice a day after lunch and dinner <i>Gokshuradi Guggulu</i> 500 mg, twice a day after lunch and dinner
June 19, 2022 to July 4, 2022	<i>Gudmar Churna</i> (2 gm) twice a day before lunch and dinner N nAmlaki Churna 3 gm twice a day before lunch and dinner <i>Panchanimba Churna</i> 3gm, twice a day before lunch and dinner <i>Shilajativadi Lauha</i> 2tb, 125mg twice a day after lunch and dinner <i>Aarogyavardhani Vati</i> 2tb, 500mg twice a day after lunch and dinner <i>Triphala Churna</i> 3gm once a day after dinner, at bedtime with Luke Warm water

Table No. 2: Counselling to the patient

S.no.	Content
	Introduction about the disease.
	Knowledge and tools to promote healthy habits and resources in order to encourage patients to maintain a healthy lifestyle, physical activity, and Yoga
	Myths and Misconception
	Real-life experiences will be provided as examples of how theory is applied to day-to-day life.
	Healthy Recipes- Preparation of menus, healthy recipes, and knowledge about the labeling of food items.

TABLE NO. 3: Advised Diet & Activities  
CHOOSE MORE OFTEN

Time	Advised Diet & Activity
6:00 am	Wake Up and Attend Natural Calls. ½ tsf of Overnight Soaked <i>Methi</i> Seeds/ <i>Karela</i> Juice / <i>Lauki</i> Juice/ <i>Giloya</i> - half cup
6:30 am	Exposure To Early Morning Sun Rays
7:00-7:30 am	Yoga Asana / Exercise- 45 Minutes
8:15 am	Breakfast Dry Fruits (Overnight Soaked Without Skin) Kodo Millet <i>Upma</i> / <i>Besan Chilla</i> / <i>Mung Daal Chilla</i> / Multigrain <i>Chapati</i> / <i>Uttapam</i> / <i>Idli</i> with Seasonal Vegetable or <i>Daal</i> : 1 Bowl Milk Tea / Black Tea
11:00 pm	Barley Water-250ml
12:30-1:00 pm	Lunch
	<i>Sabzi</i> - Green/Seasonal Vegetable: 1 Bowl (Or, As Per Appetite)
	<i>Daal</i> : 1 Bowl (Or, As Per Appetite)
	3. Multi Grain <i>Chapati</i> and One Bowl of Rice 4. <i>Lassi</i> with Roasted Cumin Seeds
4:00-5:00 pm	Dry Roasted <i>Makhana/Murmura</i> : ½-1 Bowl Dry Roasted <i>Chana</i> (Avoid in Case of Pain)
7:30-8:00 pm	Dinner
	Seasonal Vegetables and <i>Daal</i> 1 Bowl Multi Grain <i>Chapati</i> / <i>Daliya</i> / <i>Khichadi</i>
10:00 pm	Milk With 2 Pinches of Turmeric Powder/ Almond Milk

S. No.	Category	Particulars
	Grains	<i>Jau, Ragi, Jawar, Wheat</i>
	Vegetables	<i>Sahajan, Lauki, White Petha, Tori, Parwal, Tinda, Carrot, Cucumber, Capsicum, Radish, Turnip, Bitter gourd, Spinach, Methi, Bathua, Chaulai</i>
	Legumes	<i>Moong, Masoor</i>
	Fruits	Papaya, Guava, Apple, Jamun (All seasonal fruits)
	Milk Products	Buttermilk, and Milk (Low fat)

Table 1: Avoid food

S. No.	Category	Particulars
	Grains	Maize
	Vegetables	<i>Arabi, Jimikand, Kachalu, Ratalu, Corn, Gobhi, Jackfruit</i>
	Legumes	<i>Urad, Rajma, Chhole, Chana</i>
	Fruits	Banana, Jamun
	Milk Products	Curd, High-fat milk

Table 2: Other Instructions

Minimize the intake of Oil / *Ghee* (max 4-5 tsp/day), Sugar, and Salt.

Use mustard oil for cooking.

Food should be taken fresh and warm.

Fruits/salad can be taken between the meals, if hungry.

Take lukewarm water at least thrice a day.

Eat only when hungry (Two meals a day).

Do not sleep in daytime.

The patient was advised to maintain a Daily diary to record the food he consumed to track the improvement in his behavior and to provide tips and modifications accordingly.

Follow-up and outcome

Marked improvement was noted in HbA1c and weight [Table 6], after behavioral modification along with Ayurvedic prescriptions. The patient has followed the diet and lifestyle as per the advice.

Table No. 6: Noted Improvements

Parameters	Before (21/05/2022)	After (8/08/2022)
HbA1c	8.5	5.3
Weight (in Kg)	82	78

## Discussion

According to Ayurveda, *Ahara* (~Diet), *Nidra* (~sleep), and *Brahmacharya* (~celibacy) are sub-pillars for positive health, only if followed properly in terms of quality and quantity.<sup>vi</sup> Among three pillars, great importance is paid to *Ahara* and it is termed as *Mahabhaishajya*<sup>vii</sup>. Acharya Charaka has considered every *Dravyas*(~Matter) as *Aushadhis*(~ Medicine) (Nanausadhibhutam)<sup>viii</sup>. In the present scenario, prolonged consumption of junk food, frequent snacking, and prolonged sitting hours leads to the manifestation of *Prameha*. Here, the *Doshas* are vitiated due to a cluster of factors involving both poor diet and lifestyle habits. In present case, patient was educated about the diseases and its factors responsible for the pathogenesis and progression of the disease, and patient was advised to follow a specific diet and lifestyle accordingly. Advised diet includes *Nitya Sevaniya* (~ food preferred for daily consumption) and *Pathya-Ahara* (~Wholesome Diet).<sup>ix</sup> Patient was counseled to take soaked *Methi* seeds (Fenugreek seeds -*Trigonella foenumgraecum*)/ *Karela* juice (Bitter gourd -*L. Momordica charantia*)/ *Giloya*(~*Tinospora Cordifolia*) in the morning hours due to their anti-diabetic effects. *Methi* seeds are abundant in fiber and have multiple benefits in diabetic patients. Glucose lowering effect of *Methi* seeds has been proven from various research. Various researches conducted on human subjects are evident that *Methi* seeds are anti-diabetic, by reducing fasting blood glucose levels and improved glucose tolerance<sup>x</sup>. *Methi* seeds is currently available as a nutraceutical specially for the diabetic patients.<sup>xi</sup>

*Karela* juice is *Tikta* (~Bitter) *Rasa*(~Taste) dominant *Ahara*(~Diet) hence, indicated in *Premea*.<sup>xii</sup> Lectin present in *Karela* is responsible for hypoglycemic effect which act on peripheral tissues and suppress the appetite, it shows similarity to insulin's effects in the brain.<sup>xiii</sup> *Giloya* is also *Tikta* (~Bitter) *Rasa*(~Taste) dominant. According to various research it has been found that *Giloya* is rich source of Alkaloids, saponins, tannins, flavonoids, cardiac glycosides, and steroids which play an anti-diabetic role<sup>xiv</sup>. *Jau* (~Barley water) and addition of *Jau*<sup>xv</sup> flour to the simple wheat flour is advised because it is *Madhura* (~Sweet) and *Kashaya* (~Astringent) in taste, *Ruksha*

(~Dry) and alleviates *Kapha*, provides strength and gives Stability.<sup>xvi</sup> *Yava* possesses anti-obesity and anti-diabetic effects due to its properties and *Sheeta Veerya*(~Cold in Potency) gives the sensation of satiety by balancing the aggravated *Agni*(~Digestive Fire). *Yava* is also known for its *Pureesha Krut* (~increases the fecal matter) action.<sup>xvii</sup> *Yava* is responsible to increase the feces quantity by eliminating the excess fat and excretion is the only mean to eliminate the lipids from the body. *Yava* is abundant in fiber and constitutes around 3.9% of the total drug. There are variety of substances that are rich source of fiber but the type of fiber is important for the specification. *Yava* is a good source of water-soluble fiber, which is favorable to the body. Even though, wheat is also a rich source of fiber but again, not in water-soluble fiber. The water-soluble fiber increases the gastric emptying time by taking long-time to get partly digested. There it initiates the satiety center and reduces the food intake. Even initiate the sluggish movement of the intestines. It hinders the absorption through the villi thereby reducing the energy uptake. It affects the absorption of fat due to its high molecular weight. It induces enteric - absorption of cholesterol which reduces the cholesterol level and mobilizes the stored fat. These actions increase energy utilization, gastric emptying time, mobilize the stored fat for utilization, and hamper re-absorption of enteric cholesterol and fat.

*Kshudra dhanya*/*Trindhanya*/ *Shree dhanya* known as millets, getting momentum nowadays, due to its positive effect in non-communicable disorders. Acharya Charak indicated *Trindhanya* in *Premea*.<sup>xviii</sup> And according to Bhavprakash *Kshudra Dhanya are Ruksha*(~rough), *Kasaya*(~Astringent), and have *Kleda Soshaka*(~Dry up the excess moisture from the body) properties.<sup>xix</sup> All millets have anti-diabetic properties because of their low to medium glycemic index (GI) which is 52.7, high fiber content, flavonoid, and polyphenol contents, and reduce oxidative stress by acting as anti-oxidants.<sup>xx</sup> So, the patient was advised to consume Multigrain *Roti* made up of *Ragi*(~Finger millet), *Jawar*(~Sorghum), *Bajra*(~Pearl Millet), *Jau*(~Barely), and some portion of wheat.

*Takra* (~Buttermilk) with roasted cumin seeds is recommended once a day after lunch. In Ayurveda *Takra*

is defined as *Anupan* (~vehicle/diet adjuvant). *Takra* is *Madhur* (~Sweet) *Vipak* (~conversion of taste before and after digestion), *Ushna* (~hot) *Veerya* (~Potency), *Laghu* (~light), *Ruksha* (~dry), and have *Vata kapha shamak* (~Pacifies) property. *Takra* (~buttermilk) is beneficial in gastrointestinal tract disorders due to its *Deepan* (appetizer), *Sangrahi* (~with holds), *Pachana* (digestion) properties<sup>xxi</sup>. Frequent snacking is the prime complaint of diabetic patients, and in the absence of any healthy snack options, they usually choose the easily available dietary items. So, by the education module, the patient is advised about healthy snack options which includes dry roasted *Chana* (~Horse gram), *Murmura* (~Puffed rice), and *Makhana* (~Fox tail millet), which are more healthier option with added benefits. *Makhana* are easily to prepare and are taste pacifying, intake of single serving of nuts a day helps to prevent the manifestation of multiple lifestyle disorders i.e. cardiovascular disorders, type II diabetes, cancer, high blood pressure and neurodegenerative diseases.<sup>xxii</sup> Rice source of protein, carbohydrates, potassium, phosphorus, iron, fibre, zinc, magnesium, and . *Makhana* by itself has no flavor, but can easily take up any flavor that it is cooked with. Because of all its health benefits and low caloric value, this is a really good snack. Patient was advised to avoid all the possible causative factors responsible for disease progression. Diet and lifestyle is key behind the health and disease, So patient was educated to adopt healthy lifestyle which includes Physical activities as per the suitability of the patient it may be exercise, Yoga, running, dance etc. Avoiding day sleep, prolong sitting and lying in the bed was recommended to the patient.

## Conclusion

Diabetes Mellitus is a lifestyle disorder, and keeping away from the causative factors is an integral part of disease management. Education about the disease, its pathophysiology, and causative factors, modify the behavior positively which changes the attitude of the patient towards his disease. Ayurvedic medicine with customized Diet and lifestyle intervention helps in intervening the pathophysiology of the disease. The significance of behavior modification through education is distinctly visible in the current case. Health education campaigns play an important role in spreading knowledge about maintaining and regulating weight, changing one's diet, and engaging in regular exercise, as well as encouraging healthy behavior in neighborhood health facilities.<sup>xxiii</sup>

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## Conflicts of Interest

There are no conflicts of interest.

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