



Case Report

Efficacy of Integrated Ayurveda treatment protocol in type 2 diabetes mellitus – A case report

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ABSTRACT

Type 2 Diabetes Mellitus (T2DM) is a growing global concern having reached the epidemic proportion in most countries. Achieving glycaemic control decreases the risk of macrovascular and microvascular complications in T2D. To achieve and maintain good glycaemic control, lifestyle changes and pharmacological treatment is necessary. Pharmacological management of T2DM have some limitations as it may lead to vit-B12 deprivation, hypoglycemia, increased cardiovascular risk etc. Treatment algorithm that include integration of Ayurvedic treatment & diet, Panchakarma therapies and Yoga will ensure good glycaemic control and reduce the progression of complications. Diagnosed cases of T2DM without intervention of conventional pharmacological drugs will be safe and beneficial. A female patient aged about 52 years visited to diabetic specialty OPD with the following complaints: increased micturition frequency, vaginal itching, fatigue and increased thirst. Patient reported weight gain in past 1 year, was not on any conventional antidiabetic medication. Her HbA1c status confirmed diagnosis of T2DM. Patient was treated with a course of *nitya virechana* (medicated purgation) and *Sarwanga Udwartana* (Dry medicated powder rubbing whole body) for the duration of 7 days along with ayurveda medicines for 1 year. Patient was prescribed Ayurvedic diet and Yoga practices throughout the intervention. This case report reveals the protocol based integrated Ayurveda and Yoga practices for diagnosed case of T2DM without causing any untoward effect along with reversal of the diabetes.

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1. Introduction

Type 2 Diabetes Mellitus (T2DM) is the most common form of DM characterized by hyperglycaemia, insulin resistance and relative insulin deficiency [1]. According to the International Diabetes Federation (IDF), approximately 415 million adults between the ages of 20–79 years had diabetes mellitus in 2015. T2DM is proving to be a global public health burden as this number is expected to rise to 615 million by 2040 [2]. It is estimated that by 2030 this would have risen to 552 million [3]. *Ayurveda* describes a set of complex clinical disorders with frequent abnormal micturition, collectively called *Prameha* (*Diabetes Mellitus*), which correlate in many ways with obesity, metabolic syndrome, and diabetes

mellitus [4]. Type 2 DM is analogous to *Sthula pramehi* (Obese Diabetic) which is also known as *Apathyanimitaja Prameha* or acquired type of diabetes resulting due to faulty lifestyle [5]. *Samshodhana* (purification) is the best treatment for the elimination of *Doshas*. *Vagbhata* has mentioned that *Doshas* should be eliminated through the nearest pathway [6]. *Ayurvedic* medications with lifestyle modifications contribute to desired clinical outcome as proper diet and management of daily routines will remove the causative factors of disease and helps in preventing progression of the disease. *Yoga* has been practiced since ancient times to manage the physiology of the body. This not only improves the flexibility but also improves the function of both endocrines and exocrine glands of the body. Various studies have reported that *Yoga* has a positive impact in the management of Type 2 diabetes. Different *Asanas* such as *Surya Namaskara* helps in insulin production and improvement of digestive fire [7].

Present case report deals with the *Ayurvedic* approach of *Panchakarma*, *Ayurvedic* medications, *Yoga*, *Pathyaha* and lifestyle

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counseling. All of these helped to achieve desired clinical outcome without causing any side effects and there was no recurrence of symptoms in the follow up period of about one year.

2. Patient information

A female patient aged about 52 years, who was homemaker visited to diabetic specialty OPD on 14/01/2018 with the following complaints: increased frequency of micturition for 1 month (5–6 times during day and 1–2 times at night), fatigue since 1-year, increased thirst from 2 months which was progressive in nature and vaginal itching from 15 days. Patient had noticed weight gain (approx 10 kg's) in a period 12 months. Patient had hypertension for 8 years and was on antihypertensive medications. Patient had no past history of Type 2 DM and no medication history. No family history of DM was found. Timeline of the case is summarized in Table 1.

3. Clinical findings

Patient had frequent micturition, associated with fatigue, thirst and vaginal itching. Patient also had progressive weight gain. Personal details and habits of the patient include lifestyle with a lot of sitting and lying down, with minimal physical activity and sedentary lifestyle. On examination, patient had abdominal obesity and well-nourished body. She had normal menstrual and obstetric history include Gravida 2, live births 2 and no abortion history (G₂L₂A₀). The patient was 152 cm tall and weighed 82 kg and waist circumference and BMI of the patient are 38 inches and 35.5 Kg/m² respectively. Assessment on 14/01/2018 revealed FBS-174 mg/dl, PPBS-208 mg/dl, and HbA1c-8.8 together these variables confirmed the diagnosis of T2DM. Patient was found to be dull in action, lethargic with disturbed sleep and moderate appetite, *Krura koshta* (bowel hard to purgate) with increased micturition. Patient had *Pitta Kapha Prakriti* (body constitution) which was assessed using 'CCRAS Prakriti assessment scale' available on http://www.ccras.res.in/ccras_pas/

Table 1
Timeline of the case.

Year	Clinical events and Intervention
2016 to 2017	Weight gain issue (Approximately 10 kg)
Jan 2017	Started developing fatigue, lethargy
November 217	Increased thirst
December 2017	Increased micturition frequency
January 2018	Intense vaginal itching
14/01/18	FBS, PPBS, HbA1c confirmed the diagnosis of T2DM
15/01/18	IPD admission
15/1/18 to 21/1/18	Undergone purgation therapy and Udwartana procedure
	Ayurveda <i>Pathyahara</i> and <i>Yoga</i>
22/1/18	Discharged
23/1/18 to 16/4/18	<i>Ayurveda</i> medication continued; <i>Pathyahara</i> & <i>Yoga</i> was routinely Practiced.
	Remarkable improvement in Biochemical parameters
	Reached Asymptomatic phase
17/4/18 to 3/11/2019	Investigation report suggest reversal of Diabetic to prediabetic stage
	Weight loss: 10 Kg
	Asymptomatic phase
	Good energy level
	Stopped Ayurveda Medication
	Advised to continue <i>Pathyahara</i> and <i>Yoga</i> .

4. Diagnostic focus and assessment

Diagnosis was based on clinical symptoms and biochemical parameters. Patient complained of experiencing increased frequency of micturition, thirst, fatigue, marked obesity and was diagnosed with *Prameha* [8,9]. Based on history and examination, patient presented with typical features of *madhumeha* a type of *Vataja prameha*. We found *Pitta* and *Kapha* in association with it. While analysing the symptoms, thirst indicated *Pitta* dominant *Madhumeha* (8. Chi 28/61) whereas marked obesity, fatigue, lethargy indicated *Kapha* dominant *Madhumeha* (8. Su.20/17) (8. Chi 28/62). Hence diagnosis can be made as *Kapha-pittavrata Madhumeha* (*Kapha-Pitta* dominating *Madhumeha*). In Type 2 DM, presence of hyperglycaemia for months or years eventually causes the extreme thirst, frequent urination, tiredness, nausea and dizziness [10]. Since symptoms were present for more than a month, patient was obese and had absence of autoimmune diseases history [11] along with lab investigations of following variables: fasting blood sugar, post prandial blood sugar and Glycosylated haemoglobin, all confirmed diagnosis of T2 DM.

5. Therapeutic intervention

Kapha dosha (along with other 2 *doshas*) and *Medo dhatu* will dominate in *Madhumeha* [12]. Shodhana (detoxification therapy) is the first line of treatment indicated in classics. For *Kapha* and *Meda* vitiation, external treatment modalities such as *Abhyanga* (oil massage), *Udwartana* (dry powder rubbing) etc, are indicated. In this case, patient underwent for a course of *Nitya Virechana* (daily purgation therapy) with *Triphala churna* 10 gms every night for duration of 7 days. *Sarvanga Udwartana* with *T. churna* (QS) was performed for the duration of 7 days. After 7 days of above treatment, internal medication were prescribed which included *Nishakatakadi Kashaya* (contains ingredients such as *Nisha*, *kathaka*, *amalaka*, *Paranti*, *Iodhra*, *badhrika*, *Peetika*, *usira*) 15 ml tid, *Amalakyadi compound* (*Amalaki* + *Godshura* + *Sariva* + *Guduchi* + *Chopachini* + *Haridra* + *Daruharidra* + *Yashtimadhu churna* – each 10 gms + *Vanga bhasma* (2.5 gms) 1tsf BD with warm following food consumption were prescribed for a duration of 1 year (Table 2).

Ayurveda diet explained in *Madhumeha* was planned. Diet was customized as per patients traditional food intake, regional availability etc. (Table 3).

Yoga protocol included wide range of components which could be done in short duration starting from breathing practices to meditation. Patient underwent stretch breathing and loosening practices for five minutes each before advancing to *suryanamaskar* (5 minutes) and varieties of *asanas*. *Ardakati chakrasana*, *parivrattra trikonasana*, *vakrasana*, *arda matsyendriyasana*, *bhujangasana*, *dhanurasana*, *pawanamuktasana* and *matsyasana* are the *asanas* advised for 10 minutes each. *Kapala bhati* was practiced regularly which was then followed by *pranayama* like *nadi shuddi*, *bhramari* and *om chanting* for 10 minutes and cyclic meditation at the end. Relaxation technique was also part of protocol after vigorous *asanas* and *kriya*.

No any adverse events occurred during the course of treatment.

6. Follow up and outcome

Biochemical parameters were assessed at each follow up and improvement was observed in each parameter. Follow up treatment and improvement in lab parameters are summarised in Table 4. Increased micturition frequency, thirst, fatigue, vaginal

Table 2
Ayurvedic management on the case of T2DM.

Panchakarma Procedure	Method of Preparation	Method of administration	Treatment Duration	
Nitya virechana with Triphala Churna	10-g Powder of Triphala	Powder of Triphala 10 g administered after 20 min of night meal along with warm water.	7 days	
Sarvanga udwartana with Triphala Churna	Powder of Triphala-Q, S Approximately 200 g per day	Rubbing of the dry powder of Triphala to whole body empty stomach in the morning.	7 days	
Oral medication	Details of Oral medication(ingredients)	Dose	Anupana	Treatment duration
Nishakatakadi Kashaya	Nisha (<i>Terminalia chebula</i> Retz.), kathaka (<i>senegalia catechu</i>), amalaka (<i>emblica officinalis</i> linn.), Paranti (<i>ixora coccinea</i>), lodhra (<i>symplocos racemosa</i>), badhrika (<i>aerva lanata</i>), Peetika (<i>Salacia oblonga</i>), usira (<i>chrysopogon zizanioides</i>)	15 ml Tid	Luke warm water	1 year
Amalakyadi compound	Amalaki (<i>emblica officinalis</i> linn.), Gokshura (<i>tribullus terrestris</i>), Sariva (<i>hemidesmus indicus</i>), Guduchi (<i>tinospira cardifolia</i>), Chopachini (<i>smilax glabra</i>), Haridra (<i>Curcuma longa</i> Linn.) Daruharidra (<i>berberis aristata</i>), Yashtimadhu (<i>glycyrrhiza glabra</i>), Vangabhasma (<i>tin</i>)	1tsf BD	Luke warm water	1 year

itching were reduced. Her energy level was improved and healthy weight loss of about 1–2 kg per month was observed (Approximately 10 kgs in a period of 1 year).

7. Discussion

Patient treated with traditional approach i.e Panchakarma procedures, oral medicines, Ayurvedic Pathyaha and Yoga intervention.

Samshodhana (purification) and *Avaranahara* (removal of body channels' occlusion) treatment was adopted on the basis of *Samprapti* (pathogenesis), *Nityavirechana* (medicated purgation) with *T. churna* – 10 gms & *Sarvanga Udwartana* (rubbing with dry powder) with *T. churna* (QS) was done for 7 days. The *kapha* (phlegm) increasing etiologies will also increase *Meda*, this *Medas* when vitiated deposits as *Durmedas* (adipose) (8. Su.23/8–9). The line of treatment for *Medoja roga* (diseases occurred in vitiated fatty tissue) is use of *Shleshma-medohara* (reduction of *Kaphadosha* and fatty tissue), *Vataghna* (pacifying *Vatadosha*), *Ruksha-Ushna-Tikshna Virechana* (medicated purgation with rough, hot potency and penetrating properties) [13].

Udwartana i. e, rubbing the medicated powder over body in the opposite direction of the hair root. It causes *Kapha-meda vilayana* (liquification of *Kapha* and *Medas*), *sthirata* of body (stability), *twak prasadana* (nourishment of skin) [14].

Virechana was performed using *Triphala* which has the quality to eliminate both *Pitta* and *Kapha*(13. Su.6/159). It is indicated in *Prameha*, also acts as mild laxative which aids in weight loss. At the same time, *udwartana* using *Triphala* was done because body fat and weight loss can be achieved by usage of *Triphala*. It was found to be effective in diabetes as it reduces blood sugar and insulin levels because of its hypoglycaemic potentials [15]. Hence *Triphala* was selected for both *udwartana* and *nitya virechana*.

Nishakatakadi Kashaya 15 ml tid was used due to its antidiabetic action [16]. *Amlakyadi* compound 1 tsf bd was used in which ingredients such as *Gokshura* (*Tribullus terrestris*) which possess

basthishodhana (cleansing) effect reduces *Avarna* of *Kapha* and *Meda* in the microcirculation of kidneys [17]. *Vanga bhasma* also helps to pacify *Kapha* and is useful in diabetes [18]. *Amlaki* (*Emblca officinalis* G.) and *Guduchi* (*Tinospora cordifolia*) have been used for their anti-inflammatory and antioxidant action [19,20]. *Daruharidra* [21] (*Berberis aristata*) acts by decreasing oxidative stress hence useful in this condition. To attain immunomodulatory effect, *Yashtimadhu* (*Glycyrrhiza glabra*) was used and it is also an anti-diabetic [22,23]. Combined prescription of *Nishakatakadi Kashaya* and *Amlakyadi* compound had proven to be synergistic with former having disease specific effects and latter had helped in breaking the *samprapti* (Pathogenesis) of the disease.

Dietetic regimen that includes exclusion of foods that are high in sugar, including *Pathyaha*, eating smaller portions, throughout the day, adding variety of whole grain foods, fruits and vegetables everyday helped in maintaining the blood sugar levels in desired range [24]. Millets which contain high proportion of soluble dietary fibres case reduction in gastric emptying and absorption of glucose after a meal, resulting in improved glucose tolerance. Intake of millets helps with satiety but yet its not be high in calories (*guru ch aatarpana*). Lotus seeds (*Makhane* as snacks) contain some alkaloids and flavonoids with anti-obesity and hypolipidemic effects [25].

Yoga practice was prescribed from a prevalidated standard protocol which is proven to be effective as well as it efficient for the patient in terms of cost, time and efforts. Many studies have used discrete yoga protocols that are proven to be effective when used for longer duration. The protocol used for the patient was specifically chosen for achieving results in relatively shorter duration of time. Certain breathing practices, loosening practices, *Asanas*, *kriyas*, *Surya namaskara*, *Pranayama*, deep relaxation techniques and meditations were advised in which the slow breathing technique in *pranayama* causes comprehensive changes in body physiology by controlling the autonomic nervous system [26]. *Suryanamaskar* regularizes the flexibility and postural balance mechanism [27] which is directly helpful to counteract obesity. *Pranayama* alone has shown to offer

Table 3
Ayurveda Pathyahara.

Sample Menu Plan [1200 Kcal (+ or – 50 Kcal) Per day [Protein: 45 gm/day (+ or – 5 g), CHO: 195 gm, Fat: 26.5 gm/day]						
Timing Food Diary	Menu			Serving		
Morning Drink B/w 6.30 am –7 am (Any One)	1. Herbal Infused Drink 2. Ginger Lemon water 3. Cinnamom water 4. Chia seed Water			150 ml (1 glass) 100 ml 100 ml 100 ml		
8 am –9 am Breakfast options (Any one)	1. Broken wheat vegetable upma (Daliya Upma) 2. Besan Dosa(Tomato Omlette) + Herbal Chatni + Sambar 3. Barley/Whole wheat chapati + Herbal/coconut Chatni + Sambar 4. Millet Dosa/Idli + Herbal/coconut Chatni + Sambar 5. Millet Vegetable Upma 6. Moong dosa + Herbal/coconut Chatni + Sambar Breakfast with Herbal/Cardamom/Green Tea without sugar			1 bowl/1 plate 1 in no 2 tbsp 1 wati 1 in no 2 tbsp 1 wati 1 in no/2 in number 2 tbsp 1 wati 1 bowl/1 plate 1 in no 2 tbsp 1 wati 1 cup		
Mid-Morning Snack Lunch 1pm to 2 Pm	1. Medicated Buttermilk (Spiced with Ginger, Pepper, Rock salt and Jeera) Mix Veg Salad (Raw-spiced with pepper powder and Rock Salt) +Jowar/Bajra Roti +Vegetable Sabji +Boiled Pulses Sabzi/Junka/moong Dal +Peanut/Methi/Flax Chatni			1 glass (150 ml) 1 bowl 1 in number 1 wati 3/4th katori 1 tbsp		
Mid Evening Snack 4.30 pm –5 pm (Option-Any one)	1. Apple/unripened Pear Fruit +Almond +Walnut + Green Tea/Lemon tea without Sugar 2. Ghee Roasted makhanas added with Rock salt + Turmeric (Lotus flowers) +Almond +Walnut + Green Tea/Lemon tea without Sugar 3. Churmura + Unsalted Roasted Pea nut + Green Tea/Lemon tea without Sugar			1 medium Size 4 2 1 cup 1 cup 2 2 1 cup 1 plate/1 handful 1 cup		
Dinner (7 pm –8 Pm) (Option-Any one)	1. Salad (spiced with lemon, pepper, rock salt) + Herbal Soup 2. Millet Kichdi + Herbal Raita 3. Millet Rice + moong dal + Herbal Raita 4. Salad (spiced with lemon, pepper, rock salt) + Moong Soup (spiced with Pepper and Rock Salt) + vegetable pulao 5. Moong Khichdi + Salad (spiced with lemon, pepper, rock salt)			1 bowl 1 bowl 1 bowl ½ Wati 1 Katori 1 wati ½ wati 1 bowl 1 bowl (150 ml) 1 bowl 1 bowl 1 bowl		
Menu	Exchange	Gram	Calorie	Protein	CHO	Fat
Cereals	3	90	300	9	54	2.1
Rice	2	60	200	5	46	0.4
Pulses	2	60	180	13	30	1
Buttermilk	1	100 ml	26	2	2	1
Curd	1	100	62	4	4	3
Vegetable	4	400	160	8	26	1.7
Fruits	1	50 –75	50	1	10	–
Oils and Fats	3	15	135	–	–	15
Nuts and oilseeds	1	20	100	3.5	5	7.5
Total	-	-	1213 kcal	45.5 gm	177 gm	31.7 gm

*Note: Diet was customized as per the patient's traditional food intake, regional availability etc.

number of beneficial health effects including stress relief and improvement in cardiovascular functions [28]. Yoga causes Parasympathetic activation which in turn helps to achieve overall metabolic and psychological improvement through stress reduction,

increased insulin sensitivity, and improved glucose tolerance and lipid metabolism [29,30].

This integrated approach which contains oral Ayurvedic drugs, Panchakarma procedures, Yoga protocol and Ayurveda diet were

Table 4
Showing treatment protocol and improvement in Lab parameter.

Visits	Treatment	FBS, PPBS, HbA1c
1.16/4/2018	1.Nishakatakadi Kashaya 15 ml TID 2.Amalakyadi compound 1tsf BD	FBS: 134 PPBS:167 HbA1c: 7.8
2.17/7/2018	1.Nishakatakadi Kashaya 15 ml TID 2.Amalakyadi compound 1tsf BD	FBS:102 PPBS: 142 HbA1c: 7
3.14/10/2018	1.Nishakatakadi Kashaya 15 ml TID 2.Amalakyadi compound 1tsf BD	FBS:98 PPBS: 112
4.3/11/2019	1.Nishakatakadi Kashaya 15 ml TID 2.Amalakyadi compound 1tsf BD	FBS: 98 PPBS: 112 HbA1c: 6

BT and AT comparison in Lab Parameters		
Parameters	Before Treatment (14-1-18)	After treatment (19-1-19)
FBS	174 mg/dl	85 mg/dl
PPBS	208 mg/dl	102 mg/dl
HbA1C	8.8	6

helpful in treating the patient of DM. This approach may be taken into consideration for further research in DM.

8. Conclusion

Integrated *Ayurveda* treatment protocol containing *Ayurveda* medicines, *panchakarma* intervention, *Ayurvedic pathyaha* and *yoga* practise was helpful in treating type 2 diabetes mellitus. This approach can be adopted for T2DM treatment and research.

8.1. Patient perspective

The patient was satisfied with her health improvement. She was pleased with the healthy weight loss and retaining it for 4 months along with improvement in her energy level. Improvement in sleep quality and digestion, contributed to her perception of improved quality of life and recovery as a result of this holistic approach.

8.2. Patient consent

Written permission for publication of this case study had been obtained from the patient.

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Conflict of interest

None.

Author contributions

Suketha Kumari: Software, Validation, Formal analysis, Writing – review and editing.

Laxmikant SD: Conceptualization, Methodology/Study design, Investigation, Resources, Writing – original draft, Writing – review and editing, Visualization, Supervision.

Sonika B: Conceptualization, Investigation.

Suman Khanal: Conceptualization, Investigation, Data curation.

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