Diet and lifestyle-related factors associated with *Apathyanimittaja Prameha* (type 2 diabetes): A cross-sectional survey study

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Abstract

Background: Lifestyle disorders are the leading cause of death and disability worldwide. Type 2 diabetes is one such disease with high incidence in low- and middle-income countries such as India. Changed lifestyle, lack of exercise, increased consumption of fatty, fast-food items, improper dietary habits and sedentary life are the main contributory factors for this, which are showing upward trend in India. **Aims and Objectives:** The aim of the study is to identify the lifestyle factors, physical activities and psychological factors associated with type 2 diabetes among the patient aged between 20-60 years. **Materials and Methods:** A cross-sectional survey study was conducted on selected 150 patients of type 2 diabetes within 1 year of diagnosis. A survey questionnaire was used to collect the data for fulfilling the aims and objectives of the study. **Results and Observations:** 150 patients of type 2 diabetes were observed on various dietary factors, physical activities and life style factors. **Conclusion:** On the basis of survey psychological factor association with type 2 diabetes and dietary factors, physical activities and psychological factors observed in survey study. The obtained data exposed that intake of heavy, high fatty food, physical inactivity, day sleep and psychological distress as the main lifestyle factors associated with type 2 diabetes.

Keywords: *Apathyanimittaja Prameha,* lifestyle disorder, type 2 diabetes

Introduction

Type 2 diabetes is a leading cause of death and disability worldwide.[1,2] The number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014.[3] Its global prevalence was about 8% in 2011 and is predicted to rise to 10% by 2030.[4] Nearly, 80% of people with diabetes live in low and middle-income countries.[4] Asia and the Eastern Pacific region are particularly affected.[5-9] In 2011, China was home to the largest number of adults with diabetes (i.e. 90.0 million or 9% of the population), followed by India (61.3 million or 8% of the population) and Bangladesh (8.4 million or 10% of the population).[4] Change in lifestyle, lack of exercise, consumption of fast-food items, improper unbalanced dietary habits and sedentary life show upward trend in India. This has led to the growing incidence of type 2 diabetes in the society. Type 2 diabetes is caused by a combination of genetic and lifestyle factors.[10] Although genes that predispose an individual to diabetes are considered to be an essential factor in the development of the disease, activation of a genetic predisposition requires the presence of environmental and behavioral factors, particularly those associated with lifestyle. The most significant are overweight, abdominal obesity and physical inactivity.[11] Hence, it is the need of time to review the Ayurvedic literature to identify the main lifestyle-related factors contributing to the increasing incidence of type 2 diabetes. Therefore, the present study was undertaken to know the lifestyle-related factors associated with type 2 diabetes.

Aims and objectives

To identify the diet and lifestyle-related factors associated with *Apathyanimittaja Prameha* (type 2 diabetes) among the patients aged between 20 and 60 years.

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Materials and Methods

Participants and study design

A cross-sectional survey was done among 150 type 2 diabetes patients visiting the outpatient department (OPD) of the department of the Basic Principal of IPGT and RA Hospital, Jamnagar, from May 2013 to June 2014. The patients were selected using simple random sampling. Ethical clearance was obtained for this study from the Institutional Ethics Committee (Ref. PGT/7-A/Ethics/2012-2032/3552 dated February 25, 2013) and this study was also registered in the Clinical Trial Registry of India (CTRI) vide CTRI/2013/09/004028 27/09/2013. To fulfill the aims and objectives, a lifestyle questionnaire was used for survey which was based on the etiological factors mentioned in Ayurvedic classics that comprise *Aharatmaka* (dietary factors), *Viharatmaka* (physical activities), *Manasika* (psychological), *Nidana* (etiology). The questionnaire was validated by the Departmental Research Committee of Institute for Postgraduate Teaching and Research in Ayurveda (IPGT and RA), Jamnagar (Ref. BP/2013-2014/25, dated April 4, 2013). All participants were interviewed in the local language. Each lifestyle-related question was explained properly to the patient and the response was noted in the survey questionnaire by a single person. Written informed consent was taken from patients as per the Declaration of Helsinki after offering sufficient explanations about the study and its aims.

Diagnostics criteria

Only pre-diagnosed cases were selected for the present survey study, who were suffering from *Apathyanimittaja Prameha* (type 2 diabetes) since one year.

Inclusion criteria

*   Diagnosed cases of *Apathyanimittaja Prameha* (type 2 diabetes) of chronicity not more than 1 year, attending the OPD of Basic Principles of IPGT and RA, hospital were selected without any bar of caste, religion, occupation, economic status and gender from the age group of 20–60 years.

Exclusion criteria

*   Patient diagnosed as a case of type 1 diabetes or pregnant women and lactating mothers or severe diseased condition suffering from any serious or acute illness were excluded.

Investigation

Pre-diagnosed patients of type 2 diabetes, who were previously investigated for their glycosylated hemoglobin (HbA1$_C$) level, which was $\geq$6.5% and fasting plasma glucose (FPG) $\geq$126 mg/dl and 2 hours postprandial glucose (PPG) was $\geq$200 mg/dl were taken for this survey.

Observations

Observations are related to principle variables namely age, gender, education, occupation, socioeconomic status, family history, chronicity of disease and body mass index (BMI). Dietary factors included food intake pattern, timing, quantity, heavy and fatty food intake, intake of sweets, water consumption in relation to food, frequency of taking food items weekly such as ghee and ghee-based sweets, sugarcane preparation, milk products, intake of curd in evening/night time, fatty food and non-vegetarian food. Physical factors included involvement in physical activities, sleep pattern, day sleep, duration of sleep in 24 hours and waking up time in the morning, and mental factors included distribution of patients based on psychological factors [Tables 1 and 2].

Table 1: Baseline characteristics of patients and body mass index, chronicity and family history

Character	Categories	Number of patients (%)
Age (years)	20-30	7 (4.6)
	31-40	26 (17.33)
	41-50	60 (40)
	51-60	57 (38)
Gender	Male	90 (60)
	Female	60 (40)
Marital status	Married	146 (97.33)
	Unmarried	3 (2)
	Widow (er)	1 (0.67)
Religion	Hindu	133 (88.67)
	Muslim	13 (8.6)
	Sikh	1 (0.6)
	Jain	3 (2)
Education	Uneducated	33 (22)
	Primary	47 (31.33)
	Secondary	36 (24)
	Higher secondary	12 (8)
	Graduate	12 (8)
	Postgraduate	9 (6)
	PhD	1 (0.67)
Occupation	Homemaker	57 (38)
	Business	26 (17.34)
	Government employee	18 (12)
	Private sector employee	36 (24)
	Others	13 (8.6)
Socioeconomic status	Poor	47 (31.4)
	Middle	73 (48.67)
	Upper middle	27 (18)
	Rich	3 (2)
Chronicity (month)	<4	48 (32)
	4-8	40 (26.66)
	>8-12	62 (41.34)
Family history	Paternal	23 (15.33)
	Maternal	25 (16.67)
	Negative	108 (72)
BMI	<18.5	6 (4)
	18.5-24.9	54 (36)
	25-29.9	71 (47.34)
	30-34.9	16 (10.66)
	35-39.9	2 (1.34)
	>40	1 (0.67)

BMI: Body mass index

Table 2: Observations of diet and lifestyle related etiology factors

Factors	Categories	Number of patients (%)
Aharatmaka Nidana (dietary etiogical factors)		
Eating up to full stomach and feel heaviness after eating	>5 days in a week	12 (8)
	3-4 days in a week	80 (53.33)
	1-2 days in a week	55 (36.67)
	Less than once in a week	3 (2)
Eating in accordance to hunger	>5 days in a week	1 (0.67)
	3-4 days in a week	9 (6)
	1-2 days in a week	85 (56.66)
	Less than once in a week	55 (36.66)
Consuming food>3 times in a day	>5 days in a week	1 (0.67)
	3-4 days in a week	8 (5.33)
	1-2 days in a week	46 (30.67)
	Less than once in a week	88 (58.67)
	Never	7 (4.66)
Taking nonveg/sweets/deep fried items in evening/night food	>5 days in a week	1 (0.67)
	3-4 days in a week	11 (7.33)
	1-2 days in a week	69 (46)
	Less than once in a week	69 (46)
Taking nonveg/deep fried food/sweet items in breakfast	>5 days in a week	0 (0)
	3-4 days in a week	35 (23.34)
	1-2 days in a week	68 (45.34)
	Less than once in a week	47 (31.34)
Taking food containing more oil/*Ghrita*/butter	>5 days in a week	25 (16.67)
	3-4 days in a week	86 (57.33)
	1-2 days in a week	36 (24)
	Less than once in a week	3 (2)
Frequency of taking food items in a week		
Milk or milk products	>6 times	71 (47.34)
	3-5 times	40 (26.66)
	1-2 times	35 (23.34)
	Less than once in a week	4 (2.67)
Curd in evening/night	>5 days in a week	0 (0)
	3-4 days in a week	4 (2.67)
	1-2 days in a week	46 (30.67)
	Less than once in a week	85 (56.66)
	Never	15 (10)
Ghrita	>6 times	82 (54.67)
	3-5 times	38 (25.33)
	1-2 times	27 (18)
	<1	2 (1.33)
	Rarely or never	1 (0.67)
Ghrita based sweets	>6 times	1 (0.67)
	3-5 times	11 (7.34)
	1-2 times	63 (42)
	<1	63 (42)
	Rarely or never	12 (8)
Sugar cane preparations (sugar, jaggery)	>6 times	17 (11.34)
	3-5 times	44 (29.33)
	1-2 times	35 (23.33)
	<1	27 (18)
	Rarely or never	27 (18)
Oily and fried food	>6 times	27 (18)
	3-5 times	86 (57.34)
	1-2 times	33 (22)
	<1	4 (2.66)

Contd...

Table 2: Contd...

Factors	Categories	Number of patients (%)
Potatoes	>6 times	15 (10)
	3-5 times	101 (67.33)
	1-2 times	22 (14.67)
	<1	9 (6)
	Rarely or never	3 (2)
Viharatmaka Nidanas (life style related etiological factors)		
Exercise or go for a brisk walk in the morning/ evening	>5 days in a week	1 (0.67)
	3-4 days in a week	12 (8)
	1-2 days in a week	13 (8.66)
	Less than once in a week	33 (22)
	Never	91 (60.67)
Yoga-Asana in morning/evening time at least for 30 min	>5 days in a week	1 (0.67)
	3-4 days in a week	1 (0.66)
	1-2 days in a week	2 (1.33)
	Less than once in a week	12 (8)
	Never	134 (89.34)
Actively participate in sportive and physical activities	>5 days in a week	1 (0.67)
	3-4 days in a week	3 (2)
	1-2 days in a week	7 (4.66)
	Less than once in a week	14 (9.33)
	Never	125 (83.34)
Predominantly sedentary nature of job	>5 days in a week	3 (2)
	3-4 days in a week	36 (24)
	1-2 days in a week	64 (42.67)
	Less than once in a week	45 (30)
	Never	2 (1.34)
Sleep in day time	>5 days in a week	40 (26.67)
	3-4 days in a week	43 (28.66)
	1-2 days in a week	39 (26)
	Less than once in a week	18 (12)
	Never	10 (6.67)
Duration of day sleep	1-2 h	112 (74.66)
	2-3 h	25 (16.67)
	>3 h	3 (2)
	No day sleep	10 (6.67)
Sleep immediately after food in day time	>5 days in a week	40 (26.66)
	3-4 days in a week	42 (28)
	1-2 days in a week	38 (25.34)
	Less than once in a week	21 (13.34)
	Never	9 (6.67)
Sleep in very comfortable bed (thick, soft, cozy bed)	>5 days in a week	24 (16)
	3-4 days in a week	54 (36)
	1-2 days in a week	24 (16)
	Less than once in a week	47 (31.34)
	Never	1 (0.66)
Usually wake up after 6.00 am	>5 days in a week	6 (4)
	3-4 days in a week	18 (12)
	1-2 days in a week	60 (40)
	Less than once in a week	64 (42.66)
	Never	2 (1.34)
Suppression of natural urges of defecation, urination etc	>5 days in a week	0 (0)
	3-4 days in a week	5 (3.34)
	1-2 days in a week	101 (67.33)
	Less than once in a week	44 (29.33)

Contd...

Factors	Categories	Number of patients (%)
Table 2: Contd...		
Manasika Nidana (psychological factors)		
Always cheerful	Not at all	86 (57.34)
	No more than usual	56 (37.33)
	More than usual	8 (5.33)
Enjoying day to day activities	Not at all	55 (36.66)
	No more than usual	89 (59.34)
	More than usual	6 (4)
Feel under strain	Not at all	7 (4.66)
	No more than usual	79 (52.67)
	More than usual	63 (42)
	Much more than usual	1 (0.66)
Generally feel contented	Not at all	35 (23.33)
	No more than usual	110 (73.33)
	More than usual	5 (3.34)
Feel relaxed	Not at all	47 (31.33)
	No more than usual	95 (63.33)
	More than usual	8 (5.34)
Feel unhappy and depressed	Not at all	16 (10.66)
	No more than usual	94 (62.67)
	More than usual	40 (26.66)
Anxious since long time	Not at all	32 (21.34)
	No more than usual	81 (54)
	More than usual	37 (24.66)
Feel lazy for doing work	Not at all	0 (0)
	No more than usual	47 (31.34)
	More than usual	98 (65.33)
	Much more than usual	5 (3.33)

Discussion

The present cross-sectional study was carried in the institute. A total of 150 *Apathyanimittaja Prameha* (type 2 diabetes) patients were surveyed to determine the lifestyle-related factors associated with disease. The observations obtained in the present survey study are discussed in detail hereafter.

Age

With the advancing age, the risk of developing type 2 diabetes increases.[12] In the present study, it was found that majority of the patients (78%) were in the age group of 41–60 years. About 17.33% of patients were in the age group of 31–40 and 4.6% of patients were from the age group of 20–30 years. The prevalence of type 2 diabetes increases markedly with age and unfortunately, the age of onset has come down to younger adults and even adolescents in recent decades, especially in the countries where a major imbalance between energy intake and expenditure has emerged[13] and India is one such country.

Gender

With the growing age, both the genders are at risk of developing type 2 diabetes and the prevalence of diabetes seems to be more or less the similar in both genders.[14] In this survey study, 60% of patients were male and 40% were female. The 2011–2018 census of Gujarat state population shows that the male population is higher than the female,[15] which may be the reason that a greater

number of male patients were found in this survey. Singh *et al.* in their study on prevalence (sample size, 1664) of type 2 diabetes in Manipur reported a higher prevalence of type 2 diabetes in males than in females (male 5.1% and female 2.8%).[16] Prevalence study of type 2 diabetes (sample size, 4535) done in Andhra Pradesh by Chow *et al.* also reported high prevalence of type 2 diabetes in male than in female (male 14.3% and female 12.0%).[17] The study in Kerala also found a high prevalence of type 2 diabetes among male than in female (sample size 4988, male 7.2% and female 6.2%).[18]

Education

Low educational status is associated with decreased health awareness[19] and due to that, the people are engaged in faulty lifestyle pattern including unhealthy food habits. In this survey study, it was found that although maximum patients (78%) were educated, only 14.67% of patients had the education of graduate or above and 22% were uneducated. This wide variation in educational status clearly shows the association of low education with diabetes. Low education level has been found to be associated with the prevalence of type 2 diabetes.[20]

Occupation

Types of occupations have a significant association with diabetes. In this study, it was found that 38% of patients were homemaker, 24% were private sector employees, 17.34% had a business, and 12% were government employees. Nowadays,

due to the use of electronic machines and gadgets for most of the household works, the physical activity of homemaker is minimized. Decreased physical activities and sedentary life are one of the important causes of type 2 diabetes. Occupation have a direct role in the level of physical activities involvement. In the etiology of *Apathyanimittaja Prameha*, also, physical inactivity (*Vyayama Varjanam*) and indulgence in lying down and sitting for long duration (*Shayana Asana Prasanga*) are highlighted.[21]

Socioeconomic status
Majority of the patients surveyed in this study belonged to middle socioeconomic status (66.67%). The socioeconomic status influences, lifestyle and nutritional aspects, which in turn would influence the prevalence and profile of glucose intolerance and diabetic complications. Bhatti *et al*. also reported that prevalence of diabetes was more among middle socioeconomic status.[22]

Family history
Several studies on migrant Indians across the globe have shown that Asian Indians have an increased risk for developing type 2 diabetes and related metabolic abnormalities compared to other ethnic groups.[23-25] Here, in this study, it was found that 72% of patients had a negative family history. This finding strongly suggests that other than genetic factor, it is the lifestyle of the individual which contribute as the etiological factor of type 2 diabetes.

Chronicity
For this survey study, the patients having history of type 2 diabetes in the past 1 year or less than that were included. The reason for this was, after diagnosis and knowledge about the disease; the patients change their diet pattern and lifestyle and so patients who had history of type 2 diabetes ≥1 year were excluded, mainly to obtain authentic information about their diet and lifestyle behavior.

Body mass index
About 60.01% of patients surveyed in this study were having BMI 25 and above. Obesity has been identified as the single most important risk factor for type 2 diabetes. The WHO estimates that in 2014, ≥1.9 billion adults, 18 years and older, were overweight. Of these, over 600 million were obese.[26] Longitudinal studies have shown obesity to be a powerful predictor for type 2 diabetes.[27]

Dietary etiological factors (*Aharatmaka Nidana*)
Quantity of food
Excess food intake is mentioned as etiological factor of *Madhumeha* (diabetes).[28,29] Most of the patients (53.33%) in the present study responded that they often take food up to full stomach and feel heaviness after eating and 8% almost always and 36.67% sometimes had it.

Hunger level
In the present survey study, it was found that 56.66% of patients sometimes paid attention to their hunger level, 36.66%

patients rarely, 6% often and 0.67% patients almost always paid attention to the hunger level while eating. This shows that the patients were less caring about their hunger level which may be the cause of disturbance of *Agni* (factor responsible for digestion and metabolism in body).

Frequency of meal
In the present survey study, it was found that maximum number of patients (58.67%) were rarely, 30.67% sometimes, and 5.33% of patients were often taking food ≥3 times in a day. Here, not only the frequency of meal but also taking heavy meal without considering the hunger level may be associated with the type 2 diabetes.

Heavy food intake in evening/night time
Intake of unctuous and heavy food is the important etiological factors of type 2 diabetes.[28,29] In the present study, it was found that 46% of patients sometimes and 7.33% of patients often took deep fried/sweets/non-vegetarian food in dinner. Epidemiological studies indicate that a high-calorie and low-dietary fiber intake with a high glycemic load and low polyunsaturated to saturated fat ratio contribute toward developing chronic diseases such as type 2 diabetes and metabolic syndrome.[30-32] Thus, diet is a crucial aspect of lifestyle changes.

Heavy breakfast intake
In the present survey study, it was found that 45.34% of patients sometimes and 23.34% of patients often took deep fried food/sweets/nonveg in their breakfast. So, taking more unctuous heavy food in breakfast is found to be associated with type 2 diabetes among the people of Jamnagar, Gujarat. Breakfast is considered as the most important meal of the day.[33] Though, it is suggested that skipping breakfast in adults has been associated with higher risk of type 2 diabetes[34,35] and breakfast consumption is associated with lower risk of type 2 diabetes,[36] but it should be of whole-grain and high-fiber breakfast cereals and not the deep fried, oily and sugar loaded items.[37] Overconsumption of energy is a known risk factor for the development and progression of type 2 diabetes.[38]

Fatty food intake
Fat-rich food has a strong association with the development of diabetes.[39] In classics fried food (*Snigdha Ahara*) is mentioned as an important etiological factor of type 2 diabetes[40,41] In the present study, it was found that 57.33% of patients often and 16.67% of patients were almost always taking food containing more oil/ghee/butter. Thus, it can be taken as a factor associated with type 2 diabetes.

Intake of milk and milk products
Intake of milk and milk products are mentioned as etiological factor of type 2 diabetes.[41] Montonen J. *et al.,* in their study. found that diet rich in whole milk was associated with increased risk of type 2 diabetes.[42] In the present survey study, it was found that majority of the patients (47.34%) were taking milk or milk product ≥6 times and 26.66% patients 3–5 times in

a week. Hence, this was one of the strong etiological factors found to be associated with type 2 diabetes.

Intake of curd in dinner

Intake of curd is specially contraindicated in dinner,[43] and it is mentioned as one of the etiological factors of diabetes (*Prameha*).[41] In the present survey study, it was found that 56.66% patients were rarely taking curd in dinner, 30.67% patients sometimes, 10% never, and 2.67% patients often took curd in dinner. Hence, this was not found to be a major factor associated with type 2 diabetes.

Intake of Ghrita and Ghrita-based sweets

Most of the patients (54.67%) were taking *Ghrita* ≥6 times and 25.33% patients 3–5 times in a week. About 42% patients also reported that they took *Ghrita*-based sweets 1–2 times and 7.34% 3–5 times in a week. All the patients were consuming *Ghrita* which was available in the market. The manufacturers of *Ghrita*, its purity, properties and processing methods were not properly known. This ghee cannot be compared with the *Ghrita* explained in Ayurveda texts, which is described as the best *Sneha Dravya* (unctuous substance) having several health benefits such as improving memory and intellect and pacifies the effect of *Visha* (poison).[44] In previous studies, it was found that particularly in South Asians, the increase carbohydrate and fat intake, along with decreased fiber intake likely contributes to obesity, metabolic syndrome and type 2 diabetes.[30,31,45]

Jaggery preparations

In Ayurvedic classics intake, of jaggery preparations in excess is mentioned as etiological factor of *Prameha*.[41] In this study, it was found that 29.33% were taking sugarcane preparations mainly jaggery and sugar 3–5 times and ≥6 times in a week respectively. Studies have shown that South Asians have a high consumption of sugar compared to other population.[46,47] In Gujarat (Midwest India), there is a practice of adding sugar or jaggery to almost all food articles pulp.[48]

Frequency of fatty food intake

In the present study, it was found that 57.34% of patients 3–5 times and 18% of patients ≥6 times in a week consumed oily and fried food such as *Poori* (an unleavened Indian bread or cake), *Bhajiya* (Indian dish consisting of vegetables deep fried with mixture of yellow flour), fried potatoes and other vegetables cooked in more oil. Habitual intake of fried/oily food (*Snigdha Ahara*) is the cause of *Apathyanimittaja Prameha* (type 2 diabetes).[26,39] Cotton is cultivated around Jamnagar area and its seed oil is mostly used by the people of the locality.[49] It has been observed in other studies that the consumption of traditional food (low in saturated fat, low in simple sugars, and high in fiber) has declined recently and energy-dense food (high in calories, carbohydrates, saturated fats and low in fiber) and nontraditional energy-dense fast food are being heavily consumed in South Asia.[46,50]

Potatoes

Consumption of potatoes as vegetable was found to be very popular and 67.33% of patients reported that they consume potatoes 3–5 times and 10% patients ≥6 times in a week. In a survey study also, consumption of potatoes was found to have adverse effects on metabolic markers which may lead to increase the prevalence of metabolic syndrome.[45] Gujarat has high production of potatoes in comparison to other states of India.[51] Potato had high glycemic index[52] and regular consumption of it may be associated with type 2 diabetes.[53] Montonen *et al*. conducted a study on dietary fibers and incidence of type 2 diabetes, in a cohort study of 4304 Finnish men and women aged 40–69 years, and they found that high consumption of potatoes with increased risk of type 2 diabetes.[42]

Lifestyle factors (*Viharatmaka Nidana*)

Other than dietary habits, the main factor which is responsible for epidemic of type 2 diabetes is "sedentarism" or the adoption of sedentary behavior. Aspects regarding it was also considered for the present in survey study.

Involvement in physical activity

Physical activity has decreased over recent decades in many populations, and this is a major contributor to the current global rise of obesity and type 2 diabetes. Physical inactivity has been found to be an independent predictor of type 2 diabetes in both cross-sectional and longitudinal studies.[13,54] In the present survey study, it was observed that only 8% of the patients were doing exercise or brisk walk in morning or evening time, 3–4 days in a week, and only 1.33% patients for 1–2 days in a week were performing *Yoga*. Maximum patients had sedentary lifestyle and they were rarely or never involved in exercise or brisk walk (60.67%) or performing *Yoga* and *Asana* (89.34%).

Sleep pattern

Enjoying the pleasure of excessive sleep (*Swapnasukham*)[43] and day sleep (*Diwaswapna*)[41] are mentioned as etiological factors of type 2 diabetes. In the present study, it was found that 28.66% patients often, 26.67% patients almost always and 26% were sometimes sleept in the day time. Among them 74.66% patients were sleeping for 1–2 h and 16.67% patients for 2–3 h in day time. Most of these patients (28% often and 26.66% almost always) went to sleep in day time immediately after having food. Sleeping in day time is contraindicated because it causes *Kapha Pitta* (biohumours) vitiation[55] and that too after food is very unhealthy practice as it vitiates *Mamsa* and *Medo Dhatu* (muscle and fat tissue).[56] It was also found that not only these patients had habit of day sleep, but they were also waking up late in day time, only 4% patients reported that they almost always and 12% often wake up from sleep before 6 am. These finding strongly suggest that such unhealthy sleep patterns are definitely associated with *Apathyanimittaja Prameha* (type 2 diabetes).

Suppression of natural urges

Acharya Vagbhata has mentioned that all the diseases are caused due to forceful expulsion or suppression of natural urges.[57] *Vega Sandharana* (suppression of natural urges) is mentioned as causative factor of type 2 diabetes.[58] In

the present study, it was found that 67.33% patients were sometimes suppressing their natural urge of defecation and urination. This may also be considered as one of the associated factors of *Apathyanimittaja Prameha* (type 2 diabetes).

Psychological factors (*Manasika Nidana*)

Middle to old age is the period of life in which persons get exposed to variety of stress like excessive desires or ambitious life, etc. Maharshi Charaka has mentioned that anxiety, anger, worry, grief and similar other stress-producing factors lead to the development of type 2 diabetes in susceptible individuals.[58] In this study, 59.34% of patients were no more than usual and 36.66% were not at all enjoying their daily activities. This may be because they were not appreciating the things they have got and lack the positive attitude toward life. A large number of patients (65.33%) reported that they more than usual feel laziness for doing the work. Such attitude may restrict their involvement in exercise or physical activities. Lack of physical activity predisposes to type 2 diabetes and makes its management more difficult.[59] Overall, it was observed that most of the patients (57.3%) were not happy in their life and though they had not suffered in life with any serious mental trauma or shock, but they were in stress because of their livelihood. These findings also give idea that only having physical comforts may not give surety of mental peace. Unhappiness, stress, laziness and not enjoying daily activities as well as negative feelings may make the person less caring and self-managing about their health. Negative emotions are found to be the risk factor for type 2 diabetes.[60] Analysis of a UK survey by a team of European researchers found that people with higher levels of psychological distress were 33% more likely to be diagnosed with the metabolic condition compared to those with low distress levels. They concluded that elevated levels of psychological distress are a risk factor for the type 2 diabetes, adding that this association may be potentially mediated by low energy levels and impaired health status.[61,62]

Conclusions

The rapidly increasing prevalence of type 2 diabetes hints the role of lifestyle factors involved in it. In the present study, it was found that the intake of high fatty diets, physical in activity, day sleep, sedentary habits and psychological distress are the chief factors associated with the *Apathyanimittaja Prameha* (type 2 diabetes).

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Conflicts of interest
There are no conflicts of interest.

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