



Research Article

www.ijrap.net



AN EPIDEMIOLOGICAL STUDY TO FIND OUT SANTARPAHOTTHA HETU IN PATIENTS OF MADHUMEHA (DIABETES MELLITUS) AT JAIPUR AND ITS PERIPHERY

Talekar Manisha ^{*1}, B. K. Sevatkar ², Deshmukh Prashant Nareshrao ³, R. Govind Reddy ⁴

¹Ph.D. Scholar, P.G. department of Roga Evam Vikriti Vijanana, National Institute of Ayurveda, Jaipur, India

²Assistant Professor, P.G. department of Roga Evam Vikriti Vijanana, National Institute of Ayurveda, Jaipur, India

³Assistant Professor, Vaidya Yagya Dutt Sharma Ayurved Mahavidyalaya, Khurja, Uttar Pradesh, India

⁴Research Officer (Scientist-III) & In-charge, R.R.A. Podar Central Ayurveda Research Institute for Cancer, Worli, Mumbai, India

Received on: 30/06/17 Accepted on: 12/08/17

*Corresponding author

E-mail: dr.mani21jan@gmail.com

DOI: 10.7897/2277-4343.085272

ABSTRACT

Madhumeha (Diabetes mellitus) is classical metabolic disorder of tissue and cellular level. Unhealthy diet and physical inactivity are the leading causes of the major non communicable diseases (NCDs) which are similar to Santarpana Hetu as mentioned by Acharya Charaka in Nidana of Prameha. A survey study was carried out to study the prevalence of Madhumeha patients and associated risk factors in terms of Santarpana Hetu on randomly selected 240 diabetic patients from OPD of NIA hospital & diabetes camps at Jaipur region. A survey proforma was prepared and detailed history of each patient fulfilling the diagnostic criteria of ADA 2016 was taken. On considering data of Santarpana Hetu, maximum patients were taking potato (100%); dairy products (100%); Basmati rice (88.75%); jaggery and its preparations (73.33%); junk food (81.66%); bakery products (72.08%) in excessive quantity and 55.41% patient were found to be with increased BMI. Factors observed related to life style are Avyayam (70.41%); Divasvap (62.08%) & Aasyasukham (58.75%). Chinta (stress) were found in 62.91% patients. This study revealed that prevalence of high glycemic index diet; dairy products; junk food and increased BMI are found dominant in diabetes patients in Jaipur and its periphery. If people avoid these faulty dietary habits and sedentary lifestyle (Nidana Parivarjana Chikitsa) then development of diabetes will be controlled upto some extent.

Keywords: Diabetes mellitus; Santarpana Hetu; Madhumeha; Dhatvagnimandya

INTRODUCTION

In the 21st century, because of invention of newer technology, man's life becomes more mechanical and having less effort to do anything. There is increasing stress and strain which leads to various physical and psychological disorders and various diseases like hypertension, arthritic disorders, cardiac diseases and most harmful Diabetes Mellitus. Among all Diabetes Mellitus is remarkable and very challenging disease. In spite of constant and meticulous efforts of medical science to cure Diabetes Mellitus, it is still in top ten lists of diseases causing death. With an estimated 40 million people in 2007, suffering from Diabetes Mellitus, now India is having the largest number of diabetics in the world and get the name 'Diabetic capital'.¹ Recent epidemiological studies from India; point to the great burden due to Diabetes and its micro and macrovascular complication on the society. This is because the status of diabetes control in India is far from the ideal status.²

Based on available data, the mean GHb level is around 9% which is at least 2% higher than the goal currently. It is estimated by International Diabetic Federation (IDF) that by 2025 every fifth diabetic subject in world will be an Indian.³ Genetic predisposition with life-style changes, increased urbanization and globalization contribute to this rapid rise of Diabetes Mellitus in India. More over Type 2 Diabetes Mellitus in Indian population appears to occur at least a decade earlier than Europeans.⁴ This mean that in the next 10-20 yrs productivity of the youth of our country could be seriously affected as >56% population of India is in between 15-54 years.⁵ Amongst many dreadful conditions arising because of modern day living, Diabetes mellitus is a giant

disease considered as one of the arch enemy of the mankind caused by improper diet and lifestyle. It is often referred to as a "Silent Killer". Unhealthy diet and physical inactivity are the leading causes of the major non communicable diseases (NCDs).

According to Ayurveda, Madhumeha is a classical metabolic disorder of tissue and cellular level. In Ayurveda, this condition may correlate with Dhatvagnimandya. Since Vedic period Madhumeha is a disease known to mankind and it is mentioned among the twenty types of Prameha. It is a disease in which patient passes the urine having similar with Madhu i.e. "Kashaya and Madhura taste, Pandu colour and Ruksha Guna"⁶ or when the urine of the patient become sweet and resembles with honey in any type of Prameha and the whole body becomes sweet, it is to be named as Madhumeha. It is documented as one among the twenty obstinate urinary disorders i.e. Prameha. It is also explained that, when the other Prameha are left untreated, this lead to the condition called Madhumeha.⁷ So Madhumeha can also be considered as an advanced condition or stage of Prameha.

In modern science, over eating, sedentary habits, Obesity, genetic and hereditary factors are considered as a predisposing factor for D.M., which is similar to Santarpana Hetu (nourishing, enriching causes) as mentioned by Acharya Charaka in Prameha Nidana.⁸ These Santarpana Hetu are dominant etiological factor for Agnimandya which leads to formation of Vidagdha Kapha which is Kledakara. Again this Agnimandya is responsible for the Dhatvagnimandya of each Dhatu. Due to this, Apachit/Apakva Dhatu are formed, which leads to Dhatushaithilya and Kledavridhi. Simultaneously these Nidana causes Kha-Vaigunya in Medovaha Srotasa and vitiates Medo Dhatu which is

Bahu and Abaddha in nature which makes body flaccid. As a result, this increased Kledavidhhi manifest as Prabhutavilmutrata (polyuria).

Today, the era of urbanisation has produced increased number of fast food and restaurants. The food habit and lifestyle has also been modified according to the profession /carrier of an individual. Hence much importance for taste is given but not for health benefits. Acharya Sushruta mentioned that avoidance of Nidana or causative factors is treatment.⁹ Today, in this present era, people are neglecting the causative factors for the diseases and rushing in the direction of treatment methodologies. It's the need of the hour to concentrate on the concept of Nidana Parivarjana Chikitsa i.e. towards causative factors. In every disease, this is prime theory to be followed. Acharya Charaka described that etiological factors i.e. Nidana Sevana of Prameha should be avoided. It is one of the treatments of disease. On this, Chakrapani commented that avoidance of etiological factors in Prameha is very important to control further progress of disease. Only Nidana Parivarjana is not enough but along with this proper diet management is essential¹⁰ Hence to find out cause and effect relationship between dietary & life style related causes and Madhumeha (DM) and also put awareness in current population regarding excessive use of Santarpana Hetu, this survey study has been selected.

Aim and objective

To conduct a Nidanatmaka observational study of Madhumeha (Diabetes Mellitus) with special reference to Santarpana Hetu and also put awareness in current population regarding excessive use of Santarpana Hetu.

MATERIALS AND METHODS

A cross-sectional survey study was carried out to study the prevalence of Madhumeha patients and associated risk factors in terms of Santarpana Hetu. Total 240 patients of Madhumeha (Diabetes Mellitus) fulfilling the diagnostic criteria of American Diabetes Association (ADA.) 2016, were randomly selected irrespective of age, sex, occupation and socio-economic conditions from OPD of Satellite hospital, Jawahar Nagar-resident area of Jaipur. Survey was based on a specially prepared questionnaire which included both Ayurvedic and Allopathic parameters such as Anthropometric measurement, laboratory parameters and Nidanatmaka criteria of Ayurveda. This is an epidemiological study and study was in accordance with STROBE guidelines. The informed consent from each patient was taken. The reference number of institutional ethical committee is IEC/ACA/2016/27.

The diagnostic criteria of American Diabetes Association (ADA) 2016 for Diabetes Mellitus is given below:¹¹

- FPG \geq 126 mg/dL (7.0 mmol/L),
- 2-h PG \geq 200 mg/dL (11.1 mmol/L)
- HbA1c \geq 6.5% (48 mmol/mol)

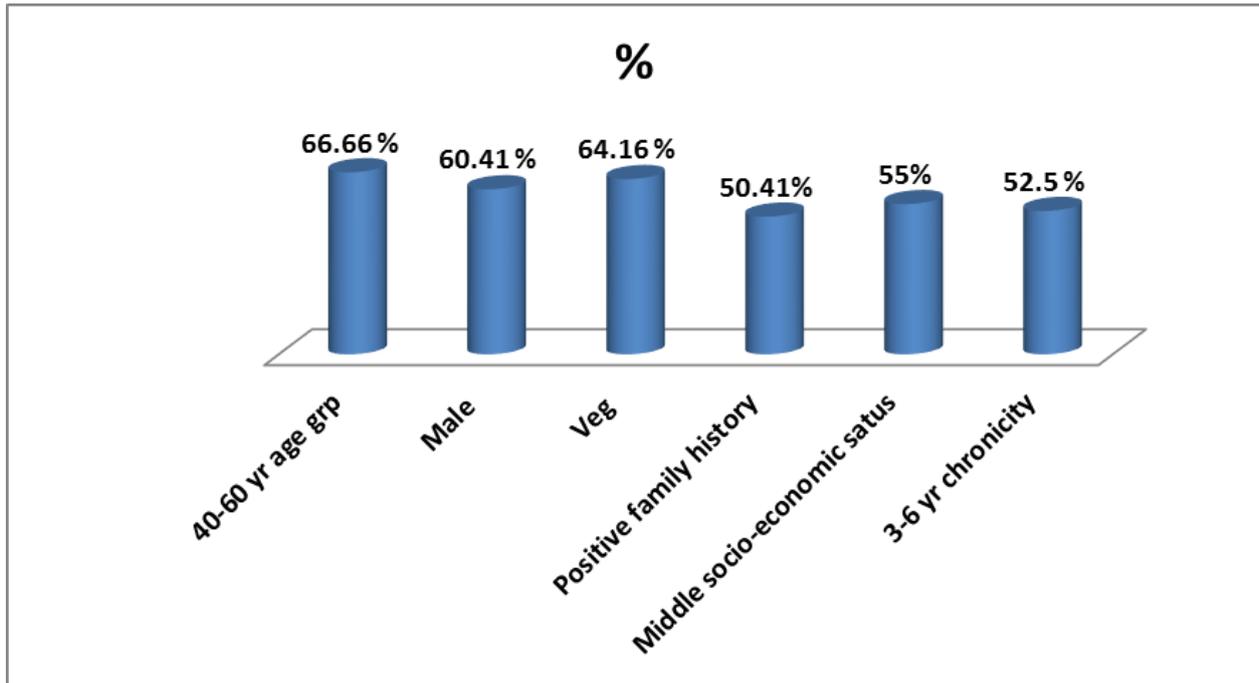
OBSERVATIONS

In Survey study out of 240 patients, maximum patients (66.66%) were found in the age group of 41-60 years. 60.41% patients were male. Maximum patients (64.16%) were taking vegetarian diet. Regarding family history, 50.41% patients had positive family history of type 2 diabetes mellitus. After the observation of chronicity of disease, it was observed that 52.50% patients were with maximum chronicity of disease i.e. 3-6 years. (Graph 1)

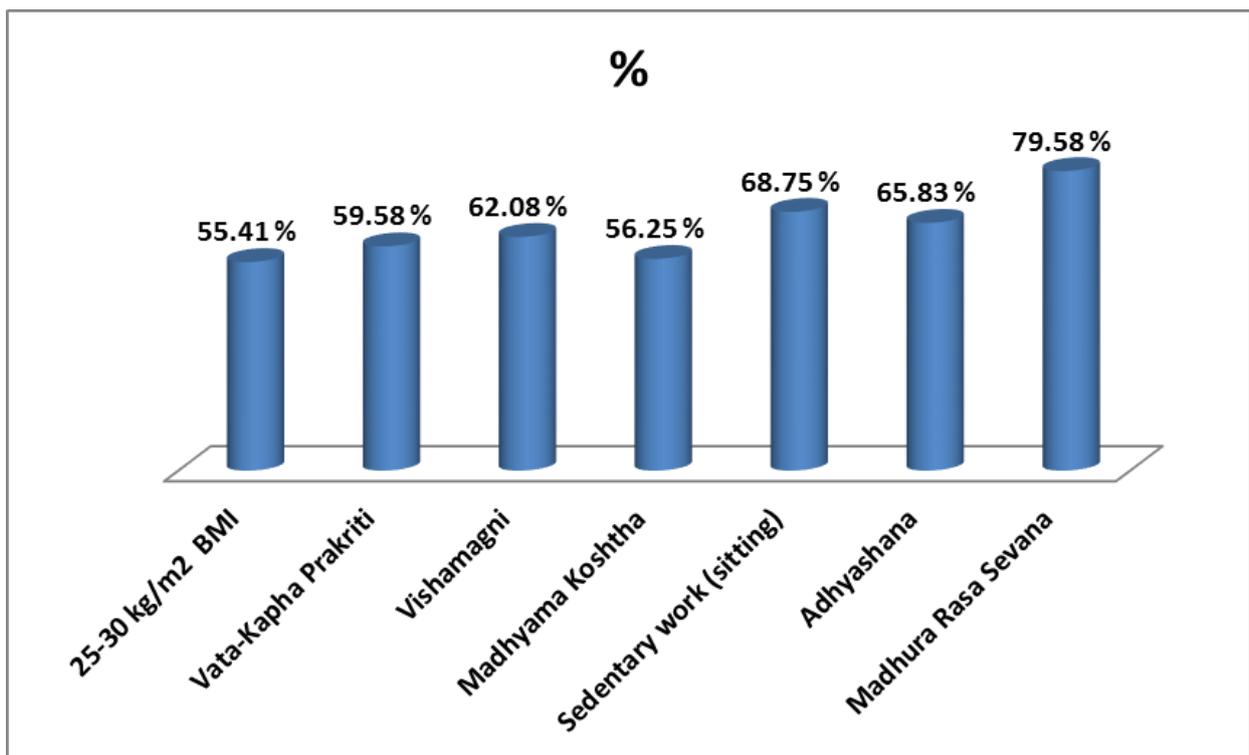
On considering the data of Sharirika Prakriti (body constitution), maximum i.e. 59.58% patients had Vata-Kapha Prakriti. 55.41% patients were having BMI 25-30 kg/m² which indicate obesity. On analyzing the Agni (digestive power) of the patients it was found that, 62.08% patients were having Vishamagni (Agnidushti). 56.25% patients had Madhyama Koshtha. Out of total 240 patients, 68.75% were having sedentary nature of work. 65.83% patients had habit of Adhyashana. Maximum patients (79.58%) were consuming more amount of Madhura Rasa (sweet food items) followed by Lavana and Amla Rasa. (Graph 2)

On considering the data of Santarpana Hetu, it was found that all i.e. 100% patients were taking potato and its preparations e.g. aloo sabji (cooked potato vegetable), French fries (batonnet or allumette-cut deep fried potatoes), chips, aloo tikki (fried spicy potato) & Maida (refined wheat flour) preparations like bread, noodles, pasta, maida biscuits, maida murukku, maida chapati, maida barfi (dessert made with condensed milk), puri (unleavened deep-fried Indian bread), jalebi (sugar crystallized flavoured funnel cake). 59.16% patients were consuming Masha and its preparation e.g. Idli, Dosa, Dhokla, Meduvada. Patients having indulgence with Basmati rice were 88.75%. Patient taking Soft drinks, Cold drinks, Sweet fruit juices were 52.91%. All patients (100%) were taking dairy products like Dugdha (milk), Dadhi (curd), butter, cheese, Ghrita (ghee) and milk preparations e.g. paneer, kheer (An Indian dessert consisting of rice and sugar boiled in milk), icecreams, shrikhand (sweet dish made of strained yogurt), rabdi (sweet condensed milk based dish) in excessive quantity. 73.33% patients were taking ikshuvikara (Jaggery and its preparations). Maximum patient (81.66%) were consuming junk food like samosa chaat (samosa is an Indian food consisting of vegetables, spices wrapped in pastry and fried; samosas are often served in chaat, alongwith the traditional accompaniments of yogurt, chutney, chopped onions, coriander, and chaat masala), dabheli (spicy snack made by mixing boiled potatoes with a dabheli masala), dahi puri (delicious savory chaat with mixed flavors and curd), sheva puri (a spicy, sweet and tangy street snack), ragada pattice (combination snack made with thick ragda (dried yellow pea stew) and pattice, a fried potato cutlet), pizza/burger/snacks Oily, spicy food etc. 72.08% patient were taking bakery products like cake, pestris, biscuit, cookies etc. (Table 1)

Factors observed related to life style are: Aasyasukham-58.75% (enjoying the pleasure of continuous sitting); Svapnasukham-66.25% (enjoying the pleasure of excessive sleeping); Avyayam-70.41% (lack of exercise and physical activity); Divasvap-62.08% (sleeping in the daytime/afternoon) (Table 2) Out of 240 patients, 62.91% patients were having Chinta as Manasa Nidana and 17.50% patients were indulged with Shoka. (Table 3)



Graph 1: Prevalence of Age Group, Gender, Diet Pattern, Family History, Socio-economic status & Chronicity of Total Study Patients (N=240)



Graph 2: Prevalence of BMI, Prakriti, Agni, Koshtha, nature of work, dietary habits & dominant Rasa Sevana of Total Study Patients (N=240)

Table 1: Prevalence of Aharaja Nidana (Dietary Factors)

Availability of Aharaja Nidana	No. of patients (n=240)	%
Shuka Dhanya (Cereals)		
Basmati Rice & its preparations (Pishthanna)	213	88.75
Maida & its preparations	240	100
Bread, Noodles, Pasta, Maida biscuits, Maida Murukku, Maida Chapati, Maida Barfi, Puri, Jalebi		
Shami Dhanya (Pulses)	142	59.16
Masha (Udad/ black gram & its preparation e.g. Idli, Dosa, Dhokla, Meduvada)		
Mamsa Varga (Non-veg)		
Gramyaudakanuparasa (meat soup of the domestic, aquatic and mashy animals)	86	35.83
Meat soup of pork, buffalo, fish etc.		
Phala Varga (Fruits juices)		
Custard apple, Grapes, Dates, Pineapple, Watermelon, Guava, Sapota	102	42.50
Shaka Varga: Kanda (tubers)		
Potato, sweet potato and its preparations e.g. Alu sabji, French fries, Chips, Alu tikki etc.	240	100
Madya Varga (Drink)		
Navamadyapana (fresh alcoholic drinks) which is not having premium quality and not fermented since long time. Sweet alcoholic drinks	76	31.66
Pana (Water)		
Soft drinks, Cold drinks, Sweet fruit juices	127	52.91
Gorasa Varga (Dairy products)		
Dugdha(Milk), Dadhi (Curd), Butter, Cheese, Ghrita (ghee)	240	100
Milk preparations e.g. Paneer, Kheer, Icecreams, Shrikhand, Rabdi		
Ikshuvikara (Jaggery and its preparations)	176	73.33
Jaggery, Sugar		
Navanna (new/not aged grains, cereals)		
Cereals and grains that are less than one year old	102	42.50
Bakery products	173	72.08
e.g. cake, pestrils, biscuit, cookies etc.		
Junk food	196	81.66
e.g. samosa chaat, dabheli, dahi puri, sheva puri, ragada pattice, pizza/burger/snacks Oily, spicy food etc.		

Table 2: Prevalence of Viharaja Nidana (Life Style Factors)

Availability of Viharaja Nidana	No. of patients (n=240)	%
Aasyasukham (enjoying the pleasure of continuous sitting)	141	58.75
Svapnasukham (enjoying the pleasure of excessive sleeping)	159	66.25
Avyayam (lack of exercise and physical activity)	169	70.41
Divasvap (sleeping in the daytime/afternoon)	149	62.08
Tyaktachinta (abstinence from mental work/ worry)	89	37.08

Table 3: Prevalence of Manasika Nidana (Psychological Factors)

Availability of Manasika Nidana	No. of patients (n=240)	%
Chinta (stress)	151	62.91
Shoka (grief)	42	17.50

DISCUSSION

For type 2 diabetes, Age is a significant risk factor. It is principally a disease of the middle-aged or an elderly. In this survey study, Maximum patients belong to the age group of 40-60 years, this reveals that maximum prevalence of the disease at Madhyama Avastha (middle age). Maximum patients were males followed by female. Modern studies show that male & female suffers from the disease equally. It is also mentioned in Ayurvedic Classics. Dalhana in his commentary remarks that females also suffer from Madhumeha. Observation of socio-economic status shows that maximum patients belong from middle class and upper middle class. Now a day, in modern civilization, peoples consume unhealthy dietary articles like junk food and sedentary lifestyle frequently. Most of patients had chronicity between 3-6 yr. which indicates Chirakari (chronic) nature of Madhumeha. One other reason may be that most patients came for ayurvedic medication because they were not getting relief from other therapies since long time. Regarding family history, equal no. of patients had

positive history of type 2 diabetes in family. It indicates that, Madhumeha have relation with Bijadosha & described as "Anushangi Vyadhi"¹² i.e. it runs in the families. But that condition afflicts the Srotasa (body channels) & for the further progress of disease it needs particular Nidanas (causes). Equal no. of patients showed negative family history, it may be due to irregular, improper, irrelevant diet habits, and regular intake of junk food and faulty lifestyle.

Regarding BMI, maximum patients had BMI 25-30 kg/m², and likely therefore being most contributing risk factor for diabetes. According to international classification of BMI as per WHO Expert Consultation for Asian population, this BMI range indicates obesity^{13, 14} which is one important cause of insulin resistance. High BMI is a strong risk factor for Diabetes. Acharya Charaka has used term "Abadhha Meda"¹⁵ (circulating fat) and also emphasized on Medovruddhi and Medodhatvagnimandya. Majority of patient were belonging to Vata-Kapha Prakriti followed by Pitta-Kapha Prakriti So it can be said that person

having Kapha dominant Prakriti are more prone to be diabetic. Maximum patients were having Madhyama Koshta. It suggests dominance of Kapha Dosha in their body. On analyzing the Agni (digestive fire), Majority of patient were having Vishamagni (imbalanced appetite) or Agnidushti which signifies the imbalanced state of Agni. Adhyashana (over eating) is found to be common in present survey, which is proved as a risk factor for Diabetes Mellitus.¹⁶ Adhyashana leading to excessive accumulation of Kapha & Meda in the body, a main Dosha and Dushya of Prameha. They may lead to Agnidushti and increased Ama production in the body.

On considering data of Ahara Nidana (Dietary Factors), Most of patients were having indulgence with rice, Masha, sweet fruit juices, potato, milk and its preparation, Dadhi (curd), Ikshuvikara (jaggery and its preparations), Madhura Rasa (sweet taste) & Lavana Rasa (salty taste), Dravannapana (liquid diet), Guru and Snigdha Ahara (heavy and unctuous diet), bakery products, junk food etc in excessive quantity. Madhura Rasa is dominant etiological factor for generation of Agnimandya (weak digestive fire) because its excessive use leads to vitiation of Agni, which is root cause of every disease. Because Agni is responsible for bio-transformation of different materials. So vitiation of Jatharagni (digestive fire) leads to vitiation of Dhatvagni and Bhutagni. Lavana Rasa is responsible for Kaphaprakopa and Kedakara. Buffalo milk is having Madhura Rasa, Madhura Vipaka (post digestive effect) & Guru Guna raises "bad" (LDL) cholesterol and promoting inflammation throughout the body. Studies have shown that high (saturated) fat intake seems to be associated with insulin resistance, obesity and increased risk of NIDDM. Excessive use of Dadhi causes Srotorodha (blockage of channels) due to its Abhishyandi nature. Ikshuvikara when consumed, raises blood glucose levels.

In survey study, prevalence of high glycaemic index diet like white rice, excessive intake of fruits viz. pine-apple, watermelon, white wheat flour bread. These diets having high glycaemic index for e.g. White flour bread with glycaemic index 71, white rice with glycaemic index 89, fruits like pine-apple, water-melon having glycaemic index 72. Glycaemic load of diet is one of the biggest factor affecting hormones. Prevalence of junk food user like samosa chaat, dabheli, dahi puri, sheva puri, ragada pattice, pizza/burger/snacks, fried foods, oily & spicy foods was more. Junk food is a classic example of unbalanced diet usually characterized by high proportion of carbohydrates, refined sugar, salt, fats & low nutritional value, which can raise various health concerns. Anything that is processed (frozen, canned, packaged or wrapped) could be considered junk food like: Fried foods, Boxed/Packaged foods, Foods with dyes, Microwavable foods, Restaurant foods, canned foods, processed foods. Junk food is unhealthy for digestive system as they slow down the digestion process making the stomach bloated. In Viharaja Nidana, maximum patients were having habit of Aasyasukha, Svapnasukham, Divasvap and Avyayama Again all these lifestyle factors increase quantity of Kapha and Abaddha Meda in the body. Regarding Manasa Nidana, Chinta (stress) were dominant in many patient along with Shoka (grief), Mano-Aghata (mental disturbance) is the cause in the production of vitiation of Agni which is also given by Acarya Charaka in Vimana Sthana chapter 2 as the wholesome food taken even in proper quantity do not get properly digested when the individual is afflicted with grief, fear, anger, sorrow, excessive sleep and excessive vigil.¹⁷ It is clear that psychological factors like stress, anger, anxiety etc. may play a major role in the etiology of Apathya Nimittaja Prameha (type 2 DM). The high prevalence of diabetes observed in urbanized societies of metro city, has been attributed to psychological stress. Disturbed psychological factors affect the blood sugar many ways like it increases glucagon secretion, inhibits insulin secretion as

well reduces insulin utilization in the body,¹⁸ which are the main reasons in type 2 Diabetes mellitus of rise the blood sugar level.

From the above discussion, we can say that the correction of various Agni in Prameha/Madhumeha may be a part of treatment. In Prameha, carbohydrate and fat metabolism is impaired and therefore intermediary acids are produced. Again due to lack of insulin or due to defect in function of liver glucose is not converted in glycogen and it retains in the body. All these unmetabolised products can be called as Ama. Insulin which is secreted by beta cells of pancreas, works as key factor for the entry of glucose at the cellular level. Thus the function of insulin is similar to the function of Dhatvagni. So, absolute or relative insulin deficiency can be correlated to Dhatvagnimandya.

CONCLUSION

This cross-sectional study revealed that prevalence of high glycaemic index diet, dairy products, junk food and increased BMI are found dominant in diabetes patient. Excessive consumption of these faulty dietary habits, faulty lifestyle and Chronic Stress play a significant role in causation of the disease with disturbance in blood glucose & lipid profile. If people avoid these faulty dietary habits and sedentary lifestyle then development of diabetes will be controlled up to some extent. Because Up to 80% of type 2 Diabetes is preventable by adopting a healthy diet and increasing physical activity. So, by exploring Nidana, it will be contribution to society making them aware about risk factor of diabetes and its association with disease.

REFERENCES

1. Saikat Neogi, Hindustan times, New delhi, Sept.03,2007-www.hindustantimes.com
2. Dr. V. Mohan, Health Administrator vol:XXII no.1&2-2009;1-18pg-<http://medind.nic.in>
3. Scree R. et. al. Diabetic atlas Gan D Ed. IDF, belgium pp 15-130, 2006 .
4. Mohan V et al, International textbook of Diabetes Mellitus 1997;171-187
5. Census of India, 2000 – <http://censusindia.gov.in>
6. Agnivesha, Charaka, Charaka Samhita revised by Dridhabala, Nidanasthana Pramehanidanadhyaya 4/44, edited by pt. Kashinath Sastri and Dr. Gorakhanath Chaturvedi, 1st edi., Chaukhambha Sanskrit Sansthana, Varanasi. 2005; 639.
7. Vagbhatta, Ashtanga Hridaya, Nidanasthana Pramehanidanadhyaya 10/20, edited by vaidya Yadunandana Upadhyaya , 1st edi., Chaukhamba Sanskrit Sansthan, Varanasi. Reprint 2005;255.
8. Agnivesha, Charaka, Charaka Samhita revised by Dridhabala, Chikitsasthana Pramehachikitsadhyaya 6/4, edited by Acharya Vidyadhara Shukla and Prof. Ravi Dutt Tripathi, 1st edi., Chaukhambha Sanskrit Sansthana, Varanasi. 2007;167.
9. Sushruta. Sushruta Samhita, Part II. Uttaratantra, Aaupadravikadhyaya 1/25, edited by Ambikadutta Shastri, 9th ed. Varanasi: Chaukhamba Sanskrit Sansthana; 1995; 14.
10. Agnivesha, Charaka, Charaka Samhita with Ayurvedadipika commentary by shri chakrapanidatta, Part III, Chikitsasthana Pramehachikitsadhyaya 6/53, edited by Dr. B. K. Dwivedi, 1st edi., Chaukhambha krishnadas academy, Varanasi; reprint 2013; 272.
11. American Diabetes Association. Standards of medical care in diabetes-2016. Diabetes Care. 2016;39(suppl 1):S1-S106.
12. Agnivesha, Charaka, Charaka Samhita revised by Dridhabala, Sutrasthana Yajjyapurushiyadhyaya 25/40, edited by pt. Kashinath Sastri and Dr. Gorakhanath

- Chaturvedi, 1st edi., Chaukhambha Sanskrit Sansthana, Varanasi. 2005; 469.
13. WHO/IASO/IOTF. The Asia-Pacific perspective: redefining obesity and its treatment. Health communications Australia: Melbourne, 2000.
 14. WHO expert consultation. Appropriate body-mass index for Asian population and its implications for policy and intervention strategies. The Lancet , 2004;157-163.
 15. Agnivesha, Charaka, Charaka Samhita revised by Dridhabala, Nidanasthana Pramehanidanadyaya 4/7-8, edited by pt. Kashinath Sastri and Dr. Gorakhanath Chaturvedi, 1st edi., Chaukhambha Sanskrit Sansthana, Varanasi. 2005; 632-633.
 16. Colledge NR, Walker BR, Ralston SH. 21st ed. Ch. 21. Edinburgh: Churchill Livingstone Elsevier; 2010. Davidson's Principles and Practice of Medicine; pp. 802–3.
 17. Agnivesha, Charaka, Charaka Samhita revised by Dridhabala, Vimanasthana Trividhakukshiyavimanadyaya 2/9, edited by pt. Kashinath Sastri and Dr. Gorakhanath Chaturvedi, 1st edi., Chaukhambha Sanskrit Sansthana, Varanasi. 2005; p.688.
 18. Principles of Anatomy and Physiology by Ferard J. Tortora, 8th Edi. P:530-594 and Harrison : Principles of Internal Medicines, edited by Eugene Braunwald, Anthony S. Fanci, Stephen L. Hauser, Dennis L. Kasper, Dan L. Longo, J. Larry. 16th edi, page no. 2156-67.

Cite this article as:

Talekar Manisha *et al.* An epidemiological study to find out Santarpanotha hetu in patients of Madhumeha (Diabetes mellitus) at Jaipur and its periphery. Int. J. Res. Ayurveda Pharm. 2017;8(5):185-190 <http://dx.doi.org/10.7897/2277-4343.085272>

Source of support: Nil, Conflict of interest: None Declared

Disclaimer: IJRAP is solely owned by Moksha Publishing House - A non-profit publishing house, dedicated to publish quality research, while every effort has been taken to verify the accuracy of the content published in our Journal. IJRAP cannot accept any responsibility or liability for the site content and articles published. The views expressed in articles by our contributing authors are not necessarily those of IJRAP editor or editorial board members.