ISSN: 2322 - 0902 (P)
ISSN: 2322 - 0910 (O)

International Journal of Ayurveda and Pharma Research

Research Article

STUDY FOR THE ASSESSMENT OF MACROVASCULAR COMPLICATIONS OF *MADHUMEHA* (T2DM) AND ITS ASSOCIATION WITH *SARA*

Prajapati Chandrashekhar[1], Tewari Priyadarshini[2]*

[1]Assistant Professor, Department of Vikriti Vigyan, Shri Krishna Ayurvedic Medical College Cholapur,
*[2]Assistant Professor, Department of Vikriti Vigyan Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University Varanasi, India.

Article info

Article History:
Received: 15-05-2023
Revised: 05-06-2023
Accepted: 21-06-2023

KEYWORDS:
Madhumeha, *Upadrava*, Macrovascular, Microvascular complications

ABSTRACT

Diabetic complications are generally classified into macrovascular and microvascular conditions. Depending on the location of the atherosclerotic lesion, macrovascular disease (coronary artery disease, cerebrovascular disease, peripheral vascular disease) may occur. The prevalence of diabetes and its complication is increasing all over the world, particularly in developing countries. It has emerged as a major public health problem in our country. The disease *Madhumeha* is described under *Prameha* and it is the subtype of *Vataja Prameha Madhumeha* manifest due to morbidity of *Shukra* and *Shonita* which is incurable. In *Madhumeha*, *Sara* is the most useful entity for the measurement of strength and the life span of an individual, so it's very important to know about *Sara* from a treatment point of view because lean and thin persons may have *Pravara Sara*. Here the attempt will be made to highlight the study for the assessment of the macrovascular complication of *Madhumeha* and its association with *Sara*. This study has been done on the basis of subjective and objective parameters in T2DM patients with macrovascular complications. *Sara* was assessed in each subject as per the scheduled proforma. In the research, we found that the diabetic complications were related to *Sara*, which is statistically highly significant. The conclusion of the study is *Avara Meda Sara* patients were found with all types of complications, only a few patients with complications belong to *Madhyama Meda Sara*, and there are no patients belonging to *Pravara Meda Sara*. Maximum patients of T2DM complication of *Asthi*, *Majja* and *Shukra Sara* having *Madhyama Sara*.

INTRODUCTION

Ayurveda is a comprehensive system of traditional health care deals with the promotion of health, prevention of the disease and effective management of different psychosomatic disorders. Physician, one among the *Chatushpaada* playing an important role in the understanding of *Vyadhi Tatva* (including *Panchanidana*) and *Vedana Nigraha* to reach the ultimate goal of science i.e., *Swasthasya Swasthya Sanrakshanam* and *Aturasya Vikaara Prashamana.*[1]

Access this article online	
Quick Response Code	
	https://doi.org/10.47070/ijapr.v11i6.2835
	Published by Mahadev Publications (Regd.) publication licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0)

The signs and symptoms of *Prameha Upadrava* are described in detail in all classical books. Most of the classical texts explained *Upadravas* in brief compared to the exhaustive descriptions of *Nidana Panchaka.* Here the attempt will be made to highlight the *Upadrava* of *Prameha* especially macrovascular complications of *Madhumeha* (Type 2 diabetes mellitus) and its association with *Sara* in Type 2 diabetes mellitus (DM) in the development of complications. [2]

The disease *Madhumeha* described under *Prameha* and it is the subtype of *Vataja Prameha. Madhumeha* (Type 2 diabetes mellitus), a syndrome, can be a crippling condition that only gets worse with time. If left untreated or improperly managed condition almost always attacks many vital systems. It has been known in detail since ancient times and its incidence is increasing day by day due to disordered lifestyle and eating habits followed by obesity followed

by *Madhumeha* and its complications. *Madhumeha* manifest due to morbidity of *Shukra* and *Shonita* which is incurable. Foods, drinks and activities which vitiate *Meda*, *Mutra* and *Kapha* are the main factors for the genesis of *Madhumeha.*[3]

Addiction to the pleasure of sedentary life style, excessive sleep, curd, meat soup, milk products, freshly harvested food articles, fresh wine, jaggery preparations etc. responsible for causing *prameha*. Improperly processed *Vata, Pitta* and *Kapha* mixes with *Dushyas* in the *Mutravaha Srotas* leading to *manifestation* of twenty types of *Prameha (C.Chi.6/8). Kulaja Madhumeha* mentioned in Ayurvedic text, which is incurable because of the morbidity in their *Bija* (genes).

Sara is the most important entity for measurement of strength and their life span of an individual, so it's very important to know about *Sara* for treatment point of view because lean and thin persons may have *Pravara Sara*. Understanding and complete knowledge of *Roga* (disease), *Rogi* (patient) *Pariksha* (examination) and *Aushadhi* (medicine) is important to get success. On the basis of predominance of particular *Dhatu* in the body, *Sara* is classified in to eight categories. *Sara Pariksha* described under *Charakokta Dashavidha Pariksha* and *Sushrutokta Dvadashavidha Pariksha* for the assessment of strength of body.[4]

Etymologically it can be defined as "*Sriyate sthari bhavati yatra tatra saraha*" i.e., the thing which becomes stable is called *'Sara'*. [5]

The *Sara Pariksha* is important because external appearances of plumpness and robustness may at times be misleading. While some people are looking lean and emaciated may actually be strong from within, those looking hale and hearty may be disease – prone due to inherent weakness in their *Dhatu* composition. Much emphasis has been laid on *Sara Pariksha* by quoting the analogy of "*Pipilika Bhara Harana vat Siddhi"*. The *Sara Pariksha* is especially meant to know the *Bala Pramana* which can be carried out in the *Atura* as well as in a *Svastha* person. [6]

Thus, the descriptions of *Kaphaj*, *Pittaj* and *Vataj Upadrava* are obviously not limited to their respective *Pramehas*. In this case, there is less chance of developing *Upadravas* because *Dhatukshaya* is minimal at the *Kaphaja Prameha* stage. Thus, *Kaphaja, Pittaja* and *Vataja Upadrava* are the result of disease according to the predominance of each *Doshas* in the severe form of *Prameha*, and *Charaka* clearly stated that *Lakshana Tridoshas* appears periodically in *Prameha*. *Prameha* is *Tridoshaja Vyadhi* and *Upadravas* also appear strongly with the participation of all *Doshas*, but the participation of the dominant *Doshas* triggers certain *Upadravas.* [7]

Diabetes Mellitus is one among the group of clinical presentations explained under the heading of etiopathogenesis and symptomatology of *Prameha*. It comprises a group of metabolic disorders in which there is reduced utilization of carbohydrates, and of lipid and protein enhanced. It is caused by a complex interaction of genetics, environmental factors, and lifestyle choices, leading to an absolute or relative deficiency of insulin. It is characterized by hyperglycaemia. Symptoms of hyperglycaemia include polyuria, polydipsia, weight loss, and sometimes with polyphagia. [8]

Diabetes and many of its problems are increasing worldwide, especially in developing countries. It has become an important health problem in our country. About 285 million people are currently living with diabetes, which equates to 6.4% of adults in the world. That number is expected to rise to 438 million, or 7, by 2030.8% of adults. There are 50.8 million diabetics in India, followed by China with 43.2 million diabetics. [9]

The sedentary lifestyle, earlier age of onset, delayed diagnosis and improper care lead to an increase in morbidity which can be said as diabetic complications like non healing ulcer, nephropathy, retinopathy etc and even mortality. Several complications like acute life threatening consequences of uncontrolled diabetes are hyperglycaemia with ketoacidosis or the nonketotic hyperosmolar syndrome. Diabetic complications are generally divided into macrovascular and microvascular diseases. According to Smelters and Bare, coronary artery dysfunction or its complications result from atherosclerotic changes in the coronary arteries. Depending on the location of the atherosclerotic disease, different types of macrovascular disease (cardiovascular disease, cerebrovascular disease, and peripheral vascular disease) may occur. Cardiovascular disease is a serious problem of the large blood vessels, primarily including myocardial infarction and stroke. People with type 1 diabetes have a 48 times greater risk of heart disease. Major microvascular complications are diabetic retinopathy, diabetic nephropathy, and diabetic neuropathy. These are small cells with thickened basement membranes of capillaries and arterioles. [10]

AIMS AND OBJECTIVES

1. To study the macrovascular complications of *Madhumeha* (Type 2 diabetes mellitus).
2. To study association *Sara* in Type 2 diabetes mellitus (DM) in the development of complications.

MATERIAL AND METHODS

The present study entitled "Study for the Assessment of Macrovascular Complications of Madhumeha (T2dm) and its Association with Sara" was carried out in the OPD & IPD of Ayurveda wing

and Endocrine O.P.D of the Sir Sunder Lal Hospital, Institute of Medical Sciences, Banaras Hindu University from December 2020 to February 2022. 100 patients of *Madhumeha* (DM) were recruited into the study. Clinical study comprises of subjective and objective criteria.

Plan of Study

Already diagnosed patients of T2DM patients will be registered for the study from OPD & IPD of S.S. Hospital *Ayurveda* wing and Endocrine O.P.D of S.S. Hospital, B.H.U. Varanasi. Selection of patients will be done by using subjective and objective criteria mentioned for diagnosis of Type 2 DMs.

Research Design

Informed Consent: Patients who fulfilled the above mentioned criteria were convinced the purpose, duration, procedure and nature of the study in details. Consent form prepared for the present study was thoroughly narrated to the patient and then requested to understand and participate in the study. The study was continued only after taking sign in the consent form, thereby giving their free and informed consent.

Details of procedure and method proposed to be used in the study

Following procedure and method will be used

- 100 patients suffering from *Madhumeha* (Type 2 Diabetes Mellitus) with having any macrovascular complication and undergoing treatment will be recruited from OPD & IPD of S.S. Hospital Ayurveda wing and Endocrine O.P.D of S.S. Hospital, B.H.U. Varanasi. Selection of patients will be done by using subjective and objective criteria mentioned for diagnosis of Type 2 DM.
- After obtaining the informed consent, patients' demography, social, marital, family and disease history of the patient will be recorded; complete physical examination will be done and recorded in a proforma.
- Selected patients will be assessed to know the *Sara* in *Madhumeha* (Type 2 Diabetes Mellitus)

Inclusive Criteria

1. Patients having >40year of age
2. Patients having both sexes
3. Patients of Type2 DM with having macrovascular complications

Exclusive Criteria

1. Patients having <40year of age
2. Patients with comorbid condition
3. Patients with other endocrinal disorders

Subjective Criteria

On basis of cardinal symptoms of T2DM patients, demographic profile, *Sara Pariksha* for this we use questionnaire proforma.

Demographic Profile

The subjects were taken for the study and interrogated thoroughly to collect the data for the study. The following points were recorded Name, Age, Age of onset of disease, Sex, Address, Religion, Occupation, Profession types, Habitats, Socio economic status, Dietary habits, Addiction and Marital status etc.

Sara Study: *Sara* was assessed in each subjects as per schedule proforma.

Diagnostic criteria for the diagnosis of DM

Classic symptoms (i.e., polyuria, polydipsia, polyphagia, weight loss) associated with following investigations

A fasting plasma glucose (FPG) level of 126mg/dl (7.0mmol/L) or higher

or

A 2 hour plasma glucose level of 200mg/dL (11.1mmol/L) or higher during a 75 g oral glucose tolerance test (OGTT),

or

A random plasma glucose of 200mg/dL (11.1mmol/L) or higher in a patient with classic symptoms of hyperglycaemia or hyperglycaemic crisis.

Criteria for Assessment

This study done on the basis of subjective and objective parameters in T2DM patients with having macrovascular complication.

Objective Criteria

1. **Haematological Parameters**
   - Complete Blood Count (CBC)
   - Random plasma glucose concentration (RPG)
   - Fasting plasma glucose (FPG)
   - Two hours after meals plasma glucose (PPPG)
   - Glycosylated haemoglobin (HbA_{1C})
2. **Radiological Parameters**
   - ECG/2D ECHO
   - NCCT of Head
   - USG colour doppler of lower limb
3. **Urine –** routine/microscopic examination (for the presence of pus cells and ketone bodies)
4. **Biochemical Test**
   - Blood urea
   - Serum creatinine

A detailed protocol will be prepared for recording the clinical finding and ancillary investigation item wise for the study of *Sara* in *Madhumeha* (Type 2 Diabetes Mellitus).

Statistical Analysis

The number and percent of cases will be determined for various sign and symptoms, the mean and standard deviation will be calculated for various continuous clinical parameter. The intergroup

comparison of sign and symptoms will be done by using chi square test, whereas unpaired T test or one way Anova will be applied for objective measurement.

$$n = \frac{Z^2_{1-\alpha/2}P(1-P)}{d^2}$$

Sara Assessment Proforma

***Twak Sara*: 16**

	Score allotted	Score obtained
Your skin looks fresh and healthy.	1	
Is your skin oily?	1	
Is your skin smooth on touch?	1	
Is your skin soft when you lift it?	1	
Is your skin glowing properly?	1	
Did you have never suffered from skin problems?	1	
Is your wound easily healed?	1	
Your skin hair is fine & short.	1	
Scarcity of hairs on the body.	1	
Do your body hairs not fall easily?	1	
Is your hair soft on touch?	1	
You are not stressed by small problems.	1	
Do you achieve as per your effort?	1	
Is your decision making capacity good?	1	
Is your learning skill good?	1	
You do not frequently fall ill.	1	
Total	16	

Avara Twak Sara 1 - 5
Madhyama Twak Sara 6 - 10
Pravara Twak Sara 11 - 16

Rakta Sara: 37

	Reddish or copper color	Oily / Moist	Shining and Radiant Bestowed with good qualities	Scores allotted	Scores obtained
Skin				3	
Face				3	
Eye				3	
Ear				3	
Nose				3	
Lips				3	
Tongue				3	
Palm				3	
Sole				3	
Nails				3	
You are not stressed by small problems.				1	
Are you enthusiastic and eager always to acquire knowledge in different areas?				1	
Are you broad and open minded?				1	
Can you not tolerate psychological stress?				1	
Can you not tolerate high temperature?				1	
Do you easily get fatigue?				1	
Are you not having good working capacity?				1	
Total				37	

Avara Rakta Sara 1 - 12
Madhayama Rakta Sara 13 - 24
Pravara Rakta Sara 25 - 37

Mamsa Sara: 37

	Steady, Firm and Heavy	**Good Looking, Fleshy and Well covered with muscles**	**Scores allotted**	**Scores obtained**
Temporal region			2	
Forehead			2	
Eye			2	
Zygomatic arch			2	
Mandible			2	
Neck			2	
Nape(back side of neck)			2	
Chest			2	
Axilla			2	
Shoulder			2	
Palm			2	
Sole			2	
Abdomen			2	
Joints			2	
Do you remember the happenings exactly as they have taken place?			1	
Are you not having the tendency to storage or grabby.			1	
Are you not overambitious?			1	
You are not stressed by small problems.			1	
Is your learning skill good?			1	
Are you having good patience?			1	
Is your body compact and muscular?			1	
You do not frequently fall ill.			1	
Are you having good working capacity?			1	
Total			37	

Avara Mamsa Sara 1 - 12
Madhyama Mamsa Sara 13 - 24
Pravara Mamsa Sara 25 - 37

Meda Sara 16

	Particularly Oily/ Unctuous and smooth	**Scores allotted**	**Score Obtained**
Complexion		1	
Hairs		1	
Skin hairs		1	
Eye		1	
Teeth		1	
Lips		1	
Nails		1	
Voice		1	
Faeces		1	
Urine		1	
Sweat		1	
Do you easily get fatigue?		1	

Your height and weight is in higher range of your age group	1	
You do not tolerate exertion.	1	
You are not stressed by small problems.	1	
You respond straight forward in all events.	1	
Total	16	

Avara Meda Sara 1 - 5
Madhyama Meda Sara 6 - 10
Pravara Meda Sara 11 - 16

***Asthi Sara* 16**

	Prominent and heavy	**Scores allotted**	**Scores obtained**
Heels		1	
Teeth		1	
Nails		1	
Mandible		1	
Ankle		1	
Length between tip of middle finger to elbow.		1	
Knee		1	
Clavicle		1	
Joints		1	
Bones		1	
Strong bigger head		1	
Do you always involved in different activities?		1	
Are you always enthusiastic and eager always to acquire knowledge in different areas?		1	
Can you tolerate stress?		1	
Your body is firm and strong.		1	
Your shoulders are broad.		1	
Total		16	

Avara Asthi Sara 1 - 5
Madhyama Asthi Sara 6 - 10
Pravara Asthi Sara 11 - 16

Majja Sara 12

	Scores allotted	**Scores obtained**
Your body is well built and proportionate.	1	
Are you exhausted even by the routine activities?	1	
Your skin is smooth and good looking.	1	
Your voice is pleasant.	1	
Do you have bigger eyes?	1	
Do you not exhaust after work out?	1	
Your joints are long.	1	
Your joints are rounded.	1	
Do you have prominent joints?	1	
Do you easily grasp and retain heard knowledge for a long time?	1	
Do you think yourself lucky?	1	
Do you get regard among your colleagues for your quality?	1	
Total	12	

Avara Majja Sara 1 - 4
Madhyama Majja Sara 5 - 8
Pravara Majja Sara 9 - 12

Shukra Sara 19

	Scores allotted	Scores obtained
Your eyes are attractive and milky white in color.	1	
Your look is gentle.	1	
You are cool and calm in nature.	1	
Do you have well formed denture?	1	
Do you have evenly distributed or healthy denture?	1	
Do you have compact, proportionate denture?	1	
Are you having smooth and clean teeth?	1	
Do you have sharp and beautiful apex of teeth?	1	
Do you have whitish color of Teeth?	1	
Are you having intense sexual desire?	1	
You are popular among opposite sex.	1	
Your skin complexion is attractive.	1	
Your skin is smooth.	1	
Your voice is pleasant.	1	
You are soft spoken.	1	
You are not stressed by small problems.	1	
Do you get regard among your colleagues for your qualities?	1	
Your buttocks are prominent.	1	
Your working capacity is good.	1	
Total	19	

Avara Shukra Sara 1 - 6
Madhyama Shukra Sara 7 - 12
Pravara Shukra Sara 13 - 19

RESULT AND DISCUSSION

Subjective Criteria

Demographic Profile

Table 1: Age wise distribution of 100 patients of *Madhumeha* (N= 100)

Age	Frequency	Percent
41- 50	34	34.0
51 - 60	32	32.0
61 - 70	27	27.0
71 - 80	7	7.0

Patients selected for study were in the range of 41 - 80 yrs. of age. The above table shows that the age predominance of 41 - 50 yrs. i.e., 34.00% and then 51 - 60 yrs. 61 - 70 yrs., 71 - 80 yrs., was 32.00%, 27.00%, 7.00% respectively.

Table 2: Sex Incidence (N= 100)

Sex	Frequency	Percent
Female	41	41.0
Male	59	59.0

Out of 100 patients, 59.00% of the patients were males and 41.00% of them were females.

Table 3: Religion incidence (N= 100)

Religion	Frequency	Percent
Hindu	95	95.0
Muslim	5	5.0

In this clinical study, 95.00% of patients were belonging to Hindu religion while 5.00% of patients belonged to Muslim religion.

Table 4: Incidence of Education (N= 100)

Education	Frequency	Percent
Graduate	37	37.0
High school	26	26.0
Illiterate	13	13.0
Intermediate	17	17.0
Post graduate	7	7.0

The above table shows that the education wise majority of the patients were graduates 37.00% and 26.00% had completed their high school. 17.00% had completed their intermediate education, 13.00% of the patients had illiterate, and 7.00% completed their intermediate education.

Table 5: Occupational Status of patients (N= 100)

Occupation	Frequency	Percent
Business	23	23.0
Farmer	2	2.0
House wife	39	39.0
Office	5	5.0
Teacher	1	1.0
Unemployed	30	30.0

Out of 100 patients, maximum no. of patients 39.00% was belonged to house wife and unemployed 30.00%. 23.00%, 5.00%, 2.00%, and 1.00% belonged to business, office, farmer, teacher respectively.

Table 6: Incidence of Marital Status (N= 100)

Marital Status	Frequency	Percent
Married	100	100.0

Clinical data shows that 100.00% of patients were married.

Table 7: Socio economic Status (N= 100)

Socioeconomic Status	Frequency	Percent
Lower	13	13.0
Middle	81	81.0
Upper	6	6.0

The present clinical study covered a cross section of the society. It was found that majority of the patients belong to middle income group i.e., 81.00% followed by 13.00% patients from lower and 06.00% from upper income group.

Table 8: Habitat Status (N= 100)

Locality	Frequency	Percent
Rural	56	56.0
Urban	44	44.0

The above table indicates the incidence of habitat in the present clinical study. It was found that majority of the patients were from rural habitat 56.00% as compared to those from the urban habitat are i.e., 44.00%.

Table 9: Address (N= 100)

Address	Frequency	Percent
Allahabad	1	1.0
Azamgarh	4	4.0
Ballia	9	9.0
Bihar	17	17.0
Chandauli	4	4.0
Deoria	1	1.0
Gazipur	8	8.0

Jaunpur	5	5.0
Mau	5	5.0
Mirzapur	1	1.0
Ramnagar	1	1.0
Sonbhdra	2	2.0
Varanasi	42	42.0

Out of 100 patients, maximum no. of patients from Varanasi i.e., 42 and minimum no. of patients from Allahabad, deoria, Mirzapur and Ramnagar i.e., 1. Other 17, 9, 8, 5, 5, 4, 4, 2 patients from Bihar, Ballia, Gazipur, Jaunpur, Mau, chandauli, Azamgarh, Sonbhdra respectively.

Table 10: BMI (N=100)

BMI(Kg/m²)	Frequency	Percent
< 18.5 (Underweight)	9	9.0
18.5 24.9 (Normal)	47	47.0
25.0 29.9 (Over weight)	34	34.0
30.0 39.9 (Obese)	10	10
> 40 (Severe Obese)		

The above table shows that maximum no. of patients was normal group of 18.5 24.9kg/m² (47.00%), Obese group of 30.0 39.9kg/m² (10.00%), and underweight group of < 18.5kg/m² (9.00%) respectively. there are no severe obese patients was found in research.

Cross table

Abbreviations

CAD Coronary Artery Disease CVA Cerebro Vascular Accident PVD Peripheral Vascular Disease

Table 11: Relation of Complication with *Twaka Sara*

Complication	*Twaka Sasra* (N= 100)						Total	
	Avara		*Madhyama*		*Pravara*			
	No.	%	No.	%	No.	%	No.	%
CAD	7	16.3%	20	50.0%	14	82.4%	41	41.0%
CAD, CVA	0	0.0%	2	5.0%	1	5.9%	3	3.0%
CAD, PVD	4	9.3%	0	0.0%	0	0.0%	4	4.0%
CVA, PVD	3	7.0%	0	0.0%	0	0.0%	3	3.0%
PVD	13	32.2%	3	7.5%	0	0.0%	16	16.0%
CVA	16	37.2%	15	37.5%	2	11.8%	33	33.0%

X^2 = 29.59 df = 9 p=0.0005

In present study the incidence of complication with *Twaka sara* were observed, we find that, the maximum CAD complication was seen in *Madhyama twaka sara* and minimum in *Avara twaka sara*. Same pattern was seen in patients having both CAD & CVA complications. CAD, PVD & CVA, PVD complications seen only in *Avara twaka sara*. PVD is more in *Avara twaka sara* and same pattern in CVA patients. On basis of above study, the data shows statistically high significant.

Table 12: Relation of Complication with *Rakta Sara*

Complication	*Rakta Sasra* (N= 100)						Total	
	Avara		*Madhyama*		*Pravara*			
	No.	%	No.	%	No.	%	No.	%
CAD	6	19.4%	28	46.7%	7	77.8%	41	41.0%
CAD, CVA	0	0.0%	2	3.30%	1	11.1%	3	3.0%
CAD, PVD	1	3.2%	3	5.0%	0	0.0%	4	4.0%
CVA, PVD	3	9.7%	0	0.0%	0	0.0%	3	3.0%
PVD	7	22.6%	9	15.0%	0	0.0%	16	16.0%
CVA	14	45.2%	18	30.0%	1	11.1%	33	33.0%

X^2 = 16.54 df = 6 p=0.011

In this table the incidence of complication was observed with *Rakta sara*, in CAD maximum number of patients is *Madhyama rakta sara*. There is no any patient of CAD, CVA in *Avara rakta sara*. In CAD, PVD maximum patients are *Madhyama rakta sara*. In CVA, PVD most of patients were *Avara rakta sara*. The above parameters show statistically significant.

Table 13: Relation of Complication with *Mamsa Sara*

Complication	*Mamsa Sasra* (N= 100)						Total	
	Avara		*Madhyama*		*Pravara*			
	No.	%	No.	%	No.	%	No.	%
CAD	10	21.3%	29	56.9%	2	100.0%	41	41.0%
CAD, CVA	2	4.3%	1	2.0%	0	0.0%	3	3.0%
CAD, PVD	4	8.5%	0	0.0%	0	0.0%	4	4.0%
CVA, PVD	3	6.4%	0	0.0%	0	0.0%	3	3.0%
PVD	8	17.0%	8	15.7%	0	0.0%	16	16.0%
CVA	20	42.6%	13	25.5%	0	0.0%	33	33.0%

X^2 = 17.5 df = 9 p=0.0414

In this table the incidence of complication was observed with *Mamsa sara*, CAD seen more *in Madhyama mamsa sara* and some patient in *Pravara mamsa sara*. In CAD, CVA & CAD, PVD and CVA, PVD the maximum patients were *Avara mamsa sara*. In CVA patients' highest number of *Avara mamsa sara* were observed. The above data shows statistically significant.

Table 14: Relation of Complication with *Meda Sara*

Complication	*Meda Sasra* (N= 100)				Total	
	Avara		*Madhyama*			
	No.	%	No.	%	No.	%
CAD	28	35.9%	13	59.1%	41	41.0%
CAD, CVA	3	3.8%	0	0.0%	3	3.0%
CAD, PVD	4	5.1%	0	0.0%	4	4.0%
CVA, PVD	3	3.8%	0	0.0%	3	3.0%
PVD	14	17.9%	2	9.1%	16	16.0%
CVA	26	33.3%	7	31.8%	33	33.0%

X^2 = 5.7 df = 6 p=0.4576

In the above table incidence of complication was observed with *Meda sara*, the maximum number of *Avara meda sara* patients were seen in all complications. It seen in some patients of *Madhyama meda sara*, there is no any patients seen in *Pravara meda sara*.

Table 15: Relation of Complication with *Asthi Sara*

Complication	*Asthi Sasra* (N= 100)						Total	
	Avara		*Madhyama*		*Pravara*			
	No.	%	No.	%	No.	%	No.	%
CAD	13	36.1%	21	39.6%	7	63.6%	41	41.0%
CAD, CVA	1	2.8%	2	3.8%	0	0.0%	3	3.0%
CAD, PVD	2	5.6%	2	3.8%	0	0.0%	4	4.0%
CVA, PVD	1	2.8%	2	3.8%	0	0.0%	3	3.0%
PVD	9	25.0%	7	13.2%	0	0.0%	16	16.0%
CVA	10	27.8%	19	35.8%	4	36.4%	33	33.0%

X^2 = 6.62 df = 6 p=0.3574

In the above table incidence of complication was observed with *Asthi sara*, we observed that the maximum number of patients is *Madhyama asthi sara* in all complications followed by some patients in *Avara asthi sara*. Only some patients of CAD & CVA are having *Pravara asthi sara*.

Table 16: Relation of Complication with *Majja Sara*

Complication	*Majja Sasra* (N= 100)						Total	
	Avara		*Madhyama*		*Pravara*			
	No.	%	No.	%	No.	%	No.	%
CAD	9	36.0%	28	41.2%	4	57.1%	41	41.0%
CAD, CVA	1	4.0%	2	2.9%	0	0.0%	3	3.0%
CAD, PVD	3	12.0%	1	1.5%	0	0.0%	4	4.0%
CVA, PVD	0	0.0%	3	4.4%	0	0.0%	3	3.0%
PVD	6	24.0%	10	14.7%	0	0.0%	16	16.0%
CVA	6	24.0%	24	35.3%	3	42.9%	33	33.0%

X^2 = 7.22 df = 6 p=0.301

In the above table incidence of complication was observed with *Majja sara*, we observed that the maximum number of patients is *Madhyama majja sara* followed by *Avara sara* in all complications. Only some patients of CAD & CVA are having *Pravara majja sara*.

Table 17: Relation of Complication with *Shukra Sara*

Complication	*Shukra Sasra* (N= 100)						Total	
	Avara		*Madhyama*		*Pravara*			
	No.	%	No.	%	No.	%	No.	%
CAD	10	32.3%	31	45.6%	0	0.0%	41	41.0%
CAD, CVA	1	3.2%	2	2.9%	0	0.0%	3	3.0%
CAD, PVD	2	6.5%	2	2.9%	0	0.0%	4	4.0%
CVA, PVD	2	6.5%	1	1.5%	0	0.0%	3	3.0%
PVD	4	12.9%	12	17.6%	0	0.0%	16	16.0%
CVA	12	38.7%	20	29.4%	1	100.0%	33	33.0%

X^2 = 3.97 df = 6 p=0.6807

In the above table incidence of complication was observed with *Shukra sara*, we observed that the maximum number of patients is *Madhyama shukra sara* followed by *Avara sara* in all complications. Only one patient of CVA having *Pravara shukra sara.*

CONCLUSION

The incidence of diabetes increases with age, and in most cases, it is diagnosed after age 40.

The prevalence of DM is similar in men and women throughout most age ramps but is slightly greater in men >60 yrs.

The *Avara Twaka* and *Rakta Sara* patients are more prone to develop cerebrovascular accidents and peripheral vascular disease like complications.

Avara Meda Sara patients were seen with all types of complications. Only a few patients' complications have *Madhyama Meda Sara*, there are no patients belonging to *Pravara Meda Sara*.

Maximum patients of T2DM complication in *Asthi*, *Majja* and *Shukra Sara* have *Madhyama Sara*.

REFERENCES

1. Pandey Pt.Kashinath, Chaturvedi Gorakhnath. Agnivesha, Charak, Dridhbala Samhita, Chaukhambha Bharti Academy, Varanasi (2009). Charak Sutra sthan, chapter 25/40, page no. 469.
2. Pandey Pt.Kashinath, Chaturvedi Gorakhnath. Agnivesha, Charak, Dridhbala Samhita, Chaukhambha Bharti Academy, Varanasi (2009). Charak nidana sthan, chapter 4/154, page no. 632 633.
3. Pandey Pt.Kashinath, Chaturvedi Gorakhnath. Agnivesha, Charak, Dridhbala Samhita, Chaukhambha Bharti Academy, Varanasi (2009). Charak Chikitsa sthan, chapter 6/15, page no. 235.
4. Pandey Pt.Kashinath, Chaturvedi Gorakhnath. Agnivesha, Charak, Dridhbala Samhita, Chaukhambha Bharti Academy, Varanasi (2009). Charak Sutra sthan, chapter 17/80 81, page no. 352.
5. Pandey Pt.Kashinath, Chaturvedi Gorakhnath. Agnivesha, Charak, Dridhbala Samhita, Chaukhambha Bharti Academy, Varanasi (2009). Charak Chikitsa sthan, chapter 6/20 21, page no. 236.
6. Pandey Pt.Kashinath, Chaturvedi Gorakhnath. Agnivesha, Charak, Dridhbala Samhita, Chaukhambha Bharti Academy, Varanasi (2009). Charak Chikitsa sthan, chapter 6/11, page no. 233.

7. Pandey Pt.Kashinath, Chaturvedi Gorakhnath. Agnivesha, Charak, Dridhbala Samhita, Chaukhambha Bharti Academy, Varanasi (2009). Charak Chikitsa sthan, chapter 6/15, page no. 235.
8. Willis M, Asseburg C, Neslusan C. Conducting and interpreting results of network meta analyses in type 2 diabetes mellitus: A review of network meta analyses that include sodium glucose co transporter 2 inhibitors. Diabetes Res Clin Pract. 2019 Feb; 148:222 233.
9. Zheng Y, Ley SH, Hu FB. Global aetiology and epidemiology of type 2 diabetes mellitus and its complications. Nat Rev Endocrinol. 2018 Feb; 14(2): 88 98.
10. American Diabetes Association: Standards of medical care in diabetes [Position Statement]. Diabetes Care 2007, 30: S4 S41.

Cite this article as:
Prajapati Chandrashekhar, Tewari Priyadarshini. Study for the Assessment of Macrovascular Complications of Madhumeha (T2DM) and its Association with Sara. International Journal of Ayurveda and Pharma Research. 2023;11(6):54-65.
https://doi.org/10.47070/ijapr.v11i6.2835
Source of support: Nil, Conflict of interest: None Declared

***Address for correspondence**
Dr. Tewari Priyadarshini
Assistant Professor,
Department of Vikriti Vigyan
Faculty of Ayurveda,
Institute of Medical Sciences,
Banaras Hindu University Varanasi,
Email: pgtpriya55@gmail.com
Mob: 8090029260