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An observational study on assessment of *Sara* in *Madhumeha* (Diabetes Mellitus) patients

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ABSTRACT

Background: *Sara* one of the factor of *Dashvidha Pariksha,* is the excellent or best functional aspect of *Dhatu* responsible for rendering strength to a person. *Madhumeha* is a morbid condition in which vitiation of *Kapha Dosha* and *Meda Dhatu* is the major factor of this disease. In this disease almost all *Dhatu* get vitiated along with *Oja,* due to which the condition of patient afflicted with *Madhumeha* goes on deteriorating and leads to serious consequences in form of complications. **Aim and Objectives:** a) To assess the *Sara* condition in the patients of *Madhumeha.* b) To assess the *Atura Bala* on the basis of *Sara Pariksha*. c) Study of complications in *Madhumeha* patients. **Materials and Methods:** The present study is a cross sectional observational study, which has been conducted in 100 patients of *Madhumeha* under Stratum A and Stratum B with the help of proforma in the form of validated questionnaire. **Results:** Maximum 80.56% patients were having *Avara Medasara* in Stratum A and 85.94% patients in Stratum B were having *Avara Shukrasara*. On overall assessment, *Madhyam Sara* and *Avara Sara* was found in maximum patients of Stratum A and B respectively.

Key words: *Sara, Bala, Madhumeha, Dhatu, Diabetes Mellitus.*

INTRODUCTION

The supreme foundation for achievement of happy life is good health which is attained by maintaining equilibrium of root factors of body. In present scenario man's ambitious nature, changing lifestyle etc. has made him so busy and negligent towards his own health. Although with the amalgamation of technology, modern medicine has been extra ordinarily developed in the field of diagnostic, prognostic and curative procedures but the preventive aspects of diseases are still untouched due to which disease burden and their complications are posing major threat to man.

In Ayurveda, there is an ocean of unique principles based on holistic approach to healthy living and treatment of diseased individual. Apart from the health promotion and management, it is blended with the sound principles of diagnosis. *Dashvidha Pariksha* mentioned in the context of *Rogi Pariksha* is one such diagnostic principle wherein *Sara* is third in the series for the assessment of strength of patient.[1] *Sara* is considered as the best functional aspect or the essence of all *Dhatu* which are one of the root factors of the body.[2] When *Sara* remains in its best status, it protects *Dhatu* from being vitiated or from any type of unwanted effects. Aggravated *Dosha* or *Nidanbala* etc. can't vitiate the *Sara* easily as it is the pure state or essence of that *Dhatu* and strong *Doshabala* or *Nidanabala* is required in order to vitiate it. Poor quality of *Dhatu* results in early manifestation or occurrence of disease. If disease occurs related to that

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Dhatu, then affliction will be in mild form. Hence, it won't be inappropriate to conclude that Sara part present in *Dhatu* is responsible for *Pratyanikbala* of that *Dhatu* where *Bala* is considered as biological strength or power of resistance against the disease and can be correlated with the immunity of an individual.

Despite effective management mentioned in modern science, diabetes related complications especially vascular complications are still very common which also impart effect on life expectancy. The aim of improving quality of life in diabetic patients has put the spotlight on need for controlling and preventing the complications associated with it. Undoubtedly Ayurveda is a boon to redress these problems. Through *Sara Pariksha*, assessment of patients' strength can be done which not only helps to plan the management but also warns about the impending effects in terms of decreased *Sarata* and thus paves the way to prevent complications associated with *Avara Sarata* in *Madhumeha* patients.

Aim and Objectives

1. To assess the *Sara* condition in the patients of *Madhumeha*.
2. To assess the *Atura Bala* on the basis of *Sara Pariksha.*
3. Study of complications in *Madhumeha* patients.

Material and Methods

In the present cross sectional study, 100 subjects were included and Disproportionate stratified random sampling (DSRS) procedure was adopted for sample selection. A clinical evaluation was done through Proforma prepared in the form of questionnaire including information obtained by history, physical examination and analysis of investigations. Two Strata were taken into consideration on the basis of age i.e. Stratum 1st (Stratum A) and Stratum 2nd (Stratum B).

- Stratum 1st : 30 – 45 Years
- Stratum 2nd : 46 – 60 Years

Modified Harvard step test[3]

For the evaluation of physical fitness index modified Harvard step test was used in which height of the platform was selected as 40 cm and prior to that screening of health risks was done so as to avoid any complications or ill effects to patients.

For each character of *Sara* one score was allotted and at last percentage dominance of Sara was calculated on the basis of total Score obtained for each Sara by simple mathematical calculations.

Determination of *Sara* was obtained as below[4]

- *Pravara Sara* : ≥70%
- *Madhyam Sara* : 40 – <70%
- *Avara Sara* : < 40%

Overall assessment was done as; [5]

- *Pravara Sara* : >75% Score in atleast 5 *Sara*
- *Madhyam Sara* : 50 – 75% in atleast 5 *Sara*
- *Avara Sara* : <50% in 4 or less *Sara*

Inclusion Criteria

- Patients of only Type 2 diabetes i.e. non insulin dependent diabetes mellitus (NIDDM).
- Patients between age group of 30 – 60 years.

Exclusion Criteria

- Patients of Type 1 DM i.e. Insulin dependent diabetes mellitus (IDDM) and Gestational diabetes.
- Patients of below age 30 years and above 60 years.

Observations

Table 1: Patient wise Distribution.

Strata	No. of Patients (n)
A	36
B	64
Total	100

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Table 2: Distribution showing Demographic data.

SN	Patients Characters	Patients in Stratum A	Patients in Stratum B
1.	Male	61.11%	59.38%
	Female	38.89%	40.62%
2.	Married	91.66%	93.75%
	Unmarried	8.34%	1.56%
	Widow	00	4.69%
3.	Government job	30.55%	23.44%
	Private job	30.55%	12.50%
	Business	8.35%	9.38%
	Housewife	19.44%	39.06%
	Unemployed/Retired	00	12.50%
	Others	11.11%	3.12%

Table 3: Family and Personal history of patients.

SN	Characters / Features	No. of patients in Stratum A	No. of patients in Stratum B
1.	Positive family history	58.33%	40.63%
	Negative family history	41.67%	59.37%
2.	Vegetarian diet	47.22%	46.87%
	Mixed diet	52.78%	53.13%
3.	*Samashana*	41.67%	40.62%
	Vishamashana	44.44%	48.44%
	Adhyashana	13.89%	10.94%
4.	*Samagni*	27.78%	21.88%
	Vishamagni	36.11%	43.75%
	Mandagni	33.33%	31.25%
	Tikshnagni	2.78%	3.12%
5.	*Madhyam Koshtha*	80.56%	51.56%
	Mridu Koshtha	2.78%	6.25%
	Krur Koshtha	16.66%	42.19%

Table 4: *Dashvidha Pariksha* wise distribution.

SN	Factors	No. of patients in Stratum A	No. of patients in Stratum B
1.	*Vata - Pittaja Prakriti*	27.78%	35.94%
	Kapha - Pittaja Prakriti	36.11%	25%
	Vata - Kaphaja Prakriti	36.11%	39.06%
2.	*Pravara Samhanan*	5.55%	7.81%
	Madhyama Samhanan	86.11%	79.69%
	Avara Samhanan	8.34%	12.50%
3.	*Pravara Pramana*	13.89%	18.75%
	Madhyama Pramana	75%	71.88%
	Avara Pramana	11.11%	9.37%
4.	*Pravara Satva*	30.55%	42.19%
	Madhyama Satva	58.34%	42.19%
	Avara Satva	11.11%	15.62%
5.	*Pravara Satmya*	27.78%	10.94%

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	Madhyama Satmya	66.67%	73.44%
	Avara Satmya	5.55%	15.62%
6.	*Pravara Abhyavaran Shakti*	16.66%	10.94%
	Madhyama Abhyavaran Shakti	80.56%	73.44%
	Avara Abhyavaran Shakti	2.78%	15.62%
7.	*Pravara Jaran Shakti*	5.55%	3.13%
	Madhyama Jaran Shakti	66.68%	53.12%
	Avara Jaran Shakti	27.77%	43.75%

Overall Sara distribution in Stratum A (Figure 1)

- None of the patients were having *Pravara Twaksara* whereas 61.11% and 38.89% patients were of *Madhyama* and *Avara Twaksara* respectively.
- In the present study 5.55%, 55.56% and 38.89% patients were having *Pravara*, *Madhyama* and *Avara Raktasara* respectively.
- *Pravara Mamsasara* patients were not found in present study whereas *Madhyam* and *Avara Mamsasara* patients were of 66.66% and 33.34% respectively.
- 80.56% patients were having *Avara Medasara* followed by 19.44% *Madhyama Medasara* patients and none was of *Pravara Medasara*.
- In case of *Asthisara* only 2.78% were of *Pravara* status, whereas 52.78% and 44.44% patients were having *Madhyama* and *Avara* status respectively.
- None of the patient was having *Pravara Majjasara* whereas 44.44% and 55.56% patients were of *Madhyama* and *Avara Majjasara* respectively.
- *Pravara Shukrasara* patient was not found in present study whereas *Madhyam* and *Avara Shukrasara* patients were 25% and 75% respectively.

Table 5: Variation of Sara Scores Obtained in Stratum A.

Sara	Mean	SD[i]	Median	95%UL[ii]	95%LL[ii]
Twaksara	47.05 %	11.81 %	46.87%	51.04 %	43.05 %
Raktasara	45.74 %	12.73 %	44.44%	50.05 %	41.43 %
Mamsasara	41.06 %	8.85%	40%	44.06 %	38.06 %
Medasara	32.47 %	11.93 %	31.25%	36.51 %	28.43 %
Asthisara	41.70 %	11.11 %	43.72%	45.46 %	37.94 %
Majjasara	34.16 %	12.04 %	30%	38.24 %	30.94 %
Shukrasara	32.68 %	11.56 %	33.33%	36.58 %	28.78 %

i – Standard deviation ii – Upper Limit iii – Lower Limit

Overall Sara distribution in Stratum B (Figure 2)

- In present study 1.56% patients were of *Pravara Twak Sara* whereas 53.13% and 45.31% were of *Madhyama* and *Avara Twak Sara* respectively.
- Present study shows that 1.56%, 60.94% and 37.50% patients were of *Pravara*, *Madhyama* and *Avara Raktasara* respectively.
- *Pravara Mamsasara* patient was not found in present study whereas 65.62% and 34.38%

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patients were of *Madhyam* and *Avara Mamsasara* respectively.

- In the present study 76.56% patients were of *Avara Medasara* followed by 43.44% *Madhyama Medasara* and none were of *Pravara Medasara*.
- In case of *Asthi Sara* only 1.56% patients were found to be of *Pravara* status, whereas 40.62% of *Madhyama* and 57.82% patients were of *Avara* status.
- None of the patients was of *Pravara Majjasara* whereas 53.13% and 46.87% patients were of *Madhyama* and *Avara Majjasara* respectively.
- Patient of *Pravara Shukrasara* was not found in present study whereas 14.06% and 85.94% patients were of *Madhyam* and *Avara Shukrasara* respectively.

Table 6: Variation of *Sara* scores in Stratum B

Sara	Mean	SD	Median	95%UL	95%LL
Twaksara	43.36 %	12.17 %	43.75%	46.40 %	40.32 %
Raktasara	43.69 %	11.53 %	44.20%	46.57 %	40.81 %
Mamsasara	41.36 %	6.96%	42.82%	43.10 %	39.62 %
Medasara	31.77 %	12.24 %	31.25%	34.84 %	28.71 %
Asthisara	41.89 %	11.92 %	37.5%	44.87 %	38.91 %
Majjasara	35.46 %	13.44 %	40%	38.82 %	32.11 %
Shukrasara	31.92 %	10.0%	33.3%	34.42 %	29.42 %

Overall Sara Assessment

In stratum A, 47% patients were of *Avara Sara* and 53% patients were of *Madhyam Sara* (Figure 5) whereas 62% and 38% patients were of *Avara* and *Madhyam Sara* respectively in stratum B (Figure 6).

Table 7: Complications / Associated features in Stratum A

Complications / Associated features	No. of Patients	Percentage
Raktagata Vata	07	19.44
Hridroga	02	5.56
Sthaulya	08	22.22
Chakshu Roga	03	8.33
Pakshaghata	01	2.77
Vrukka Roga	02	5.56
Granthi	03	8.33
Twak Vikara	04	11.11
Asthi Roga	02	5.56
Raktaja Vikara	02	5.56
Shukra Pradoshaja Vikara	02	5.56

Table 8: Complications / Associated features in Stratum B

Complications / Associated features	No. of Patients	Percentage
Raktagata Vata	16	25
Hridroga	04	6.25
Sthaulya	10	15.62
Chakshu Roga	06	9.39
Pakshaghata	03	4.69
Vrukka Roga	05	7.81
Granthi	03	4.68

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Twak Vikara	04	6.25
Asthi Roga	05	7.81
Raktaja Vikara	04	6.25
Shukra Pradoshaja Vikara	04	6.25

Figure 1: Overall Sara distribution in Stratum A

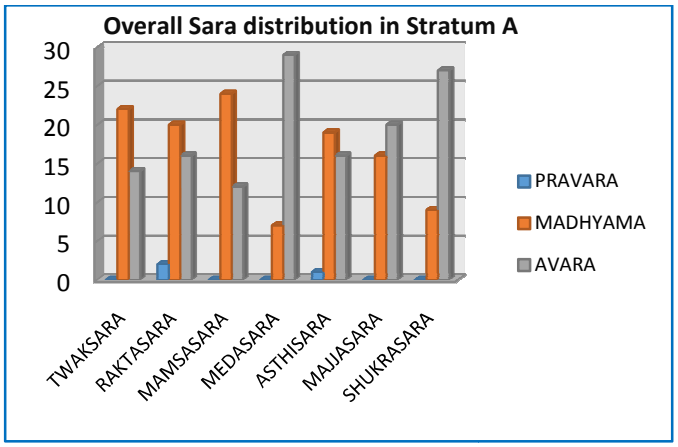


Figure 2: Variation of Sara Scores in Stratum A

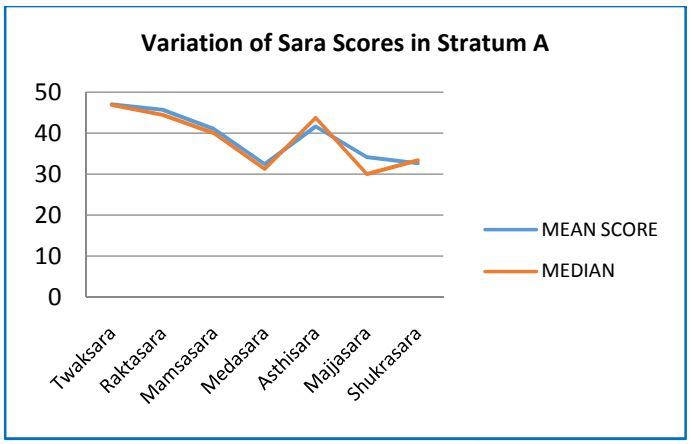


Figure 3: Overall Sara distribution in Stratum B

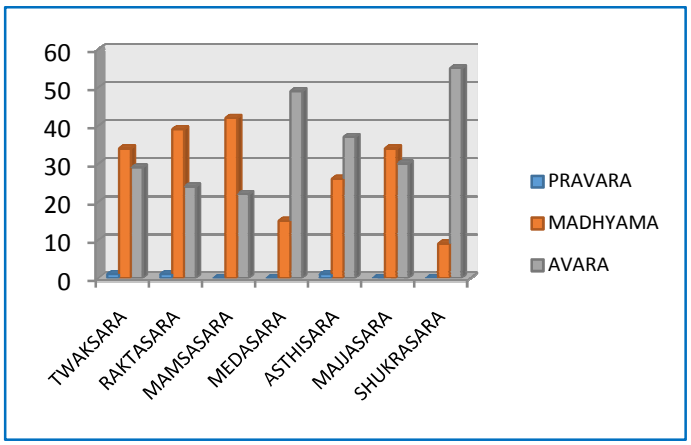


Figure 4: Variation of Sara Scores in Stratum B

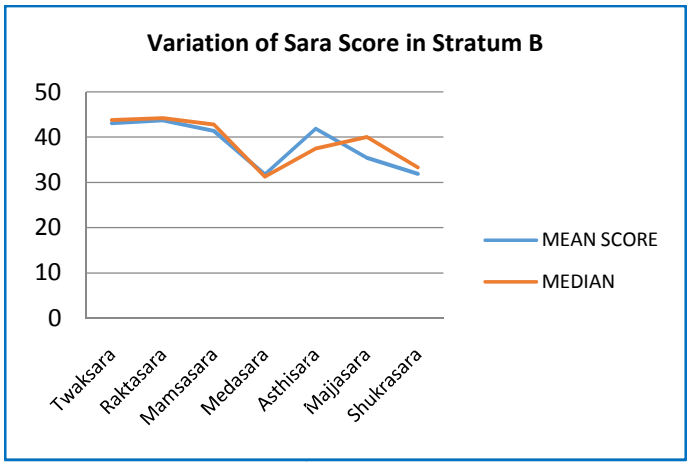


Figure 5: Overall Sara Assessment in Stratum A

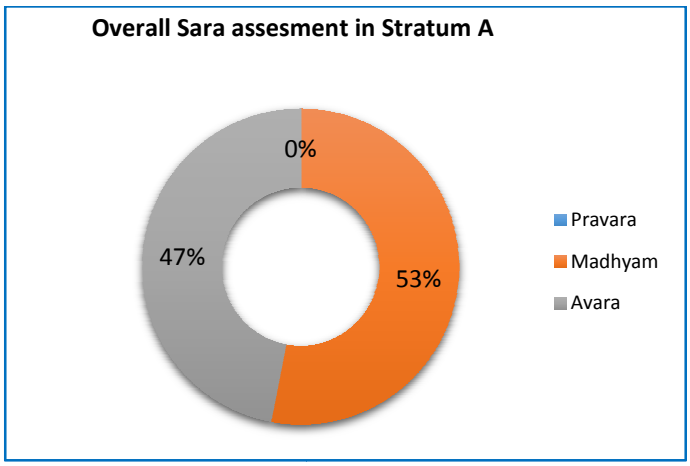
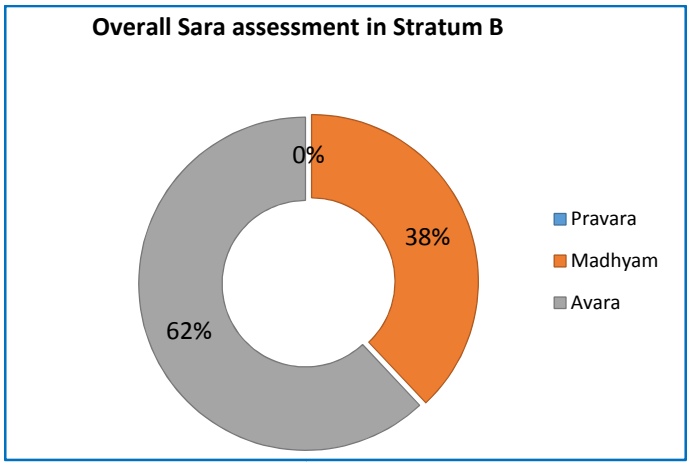


Figure 6: Overall Sara Assessment in Stratum B



DISCUSSION

In Stratum A, 36 patients were registered whereas 64 patients in Stratum B. International Diabetes Federation (IDF) statistics suggests that prevalence of Diabetes is highest among 40 - 59 years , hence the

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number of patients were high in Stratum B which included patients between 46 – 60 years age.[6]

The present study shows that maximum patients in both the Stratum were male i.e. 61.11% in Stratum A and 59.38% in Stratum B. In a research study conducted by Gale EA, it was reported that type 2 diabetes is equally prevalent among men and women in most populations, with some evidence of male preponderance in early middle age which is evident in present study as well.[7]

In the present study, in Stratum A maximum patients 30.55% were Government and private employee who were involved in desk works and 19.44% were housewives whereas in Stratum B, maximum patients 39.06% were housewives. Continuous sitting job, sedentary lifestyles, stress and strain are seen to be major contributory factors in the establishment of this disease. *Asyasukham* is considered as one of the prominent etiologic factor for this morbid condition which is evident in present study as well.[8]

Maximum patients 58.33% were seen to have positive family history. This disease is having strong genetic predisposition which is evident from above data as well.[9]

Majority of the patient in both the Stratum 52.78% in Stratum A and 53.13% in Stratum B were consuming mixed diet that means vegetarian and non vegetarian diet together. Non vegetarian diet is having dominance of *Guru, Snigdha Guna* and *Madhura Rasa* which provokes the *Kapha* and *Pitta Dosha.*[10]

Barnard Neal reported in his study that diabetes prevalence increased with the increased frequency of meat consumption.[11] In another study it is reported that amino acids, the break down products of protein metabolism, cause a form of insulin resistance.[12]

Sara Wise distribution

Stratum A: Analysis of status of individual *Sara* was done by obtaining percentage from total score of individual *Sara*. On analysis of status of individual *Sara*, maximum patients were found to have *Avara Sarata* among which *Avara Meda Sara* patients were 80.56% followed by 75% *Avara Shukra Sara* patients and 55.56% *Avara Majja Sara* patients. *Madhyam Sarata* was observed in *Twak, Rakta, Mamsa* and *Asthi Dhatu* in 66.66%, 61.11% 60.94% and 52.78% patients respectively. However 5.55% patients were having *Pravara Rakta Sara* and 2.78% patients were of *Asthi Pravara Sara*.

Stratum B: On analysis of status of individual *Sara*, maximum patients 85.94% had *Avara Shukra Sara* followed by 76.56% and 57.82% patients were having *Avara Meda* and *Avara Asthi Sara* respectively. *Madhyam Mamsa Sarata* was seen in 65.62% patients followed by 60.94%, 53.13% and 53.13% patients having *Madhyam Rakta*, *Majja* and *Twak Sara* respectively. However 1.56% patients were having *Pravara Twak, Rakta* and *Asthi Sara*.

Twak Sara indicates *Rasa* underneath Skin whose main function is *Preenana.*[13] *Madhyam* and *Avara Twak Sarata* indicates that maximum patients were having impaired *Rasa Samvahana* or circulation, it is due to impaired *Agni* especially *Rasa Dhatwagni,* which affects the *Dhatu Poshan* cycle by providing improper nutrition to both *Poshya* and *Poshaka Dhatu* thus resulting in diminished quality of *Twak Sara.*

Inferior or moderate quality was similarly reflected in the form of sub optimal *Rakta Sara.* Moderate and inferior quality or decreased *Sarata* of *Mamsa* illustrates the abnormality or deviation in *Dhatu Poshan* Series and associated factors. It reflects the poor status of *Mamsa Dhatu* which is manifested due to impaired *Mamsa Dhatwagni*, intake of improper diet and obstruction in *Mamsavaha Srotas*. *Abadhha Meda* is undoubtedly the principal *Dushya* of *Prameha* which is found in this study.[14] *Dhatu Saithilya* is important factor in the course of this disease's pathogenesis; *Avara* and *Madhyama Meda Sara* can be looked upon as possible symptoms of *Dhatu Saithilya*. *Dhatvagnimandya* is an important factor in pathogenesis of *Madhumeha*, hence anything ingested does not undergo proper transformation and ultimately gets converted into *Ama* and it hampers the process of *Dhatu Poshana* and *Dhatu Utpatti.*

In a research study it was concluded that there is significant relationship between *Uttam Meda Dhatu*

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Sarata and lipid profile test along with other parameters such as BMI, Random Blood Glucose, Hemoglobin % etc.[15] In the present study maximum patients were having *Avara Meda Sarata*. This data supports the fact that *Meda Dushti* is the key pathological phenomenon behind development of this disease. *Meda Dhatu*[16] is derived from the *Sneha* or fatty food intake and in conventional aspect it can corresponds to lipid storage and utilization in the body. Unger *et al* reported in their study that Lipotoxicity, which is a metabolic dysfunction associated with altered lipid homeostasis, is considered as one of the cause behind insulin resistance as well as pancreatic B cells dysfunction and thus play a potential role in pathogenesis of Type 2 diabetes.[17]

Overall Sara Assessment

Stratum A: Maximum patients 53% were of *Madhyam Sara* and 47% were of *Avara Sara*. *Sara Pariksha* was done to assess the *Bala* of patients and the above data gives the inference that maximum patients were having *Madhyam* or moderate *Bala* and few were of *Avara* or poor *Bala* while none of the patients were having *Pravara Bala*.

Stratum B: In present study maximum patients 62% were having *Avara Sara* followed by 38% patients were of *Madhyam Sara.* This data indicates that maximum patients in Stratum B were having poor *Bala*.

Complications:

Stratum A: Maximum 22.22% patients were having *Sthaulya* as associated feature/ complication followed by 19.44% patients were having *Raktagatvata* and *Twak Vikara* was seen in 11.11% patients. This data confirms the *Meda Dushti* in *Madhumeha* patients which is manifested in the form of *Avara Meda Sara* as *Sthaulya* is resultant from vitiation of *Meda Dhatu.*

Stratum B: Maximum 25% patients were having *Raktagatvata* as complication in Stratum B. *Rakta* is one of the prominent *Dushyas* of *Madhumeha* which is evident from this study. *Raktagatavata* has been correlated with the hypertension in modern science. The factors responsible for coexistence of HTN with diabetes are sedentary lifestyle and excessive calorie intake which in turn lead to increased adiposity and thus develops insulin resistance.

Insulin resistance is said to be responsible for increase in vascular adhesion molecular expressions, oxidative stress and inflammation, thus decreased vascular nitric oxide levels which in turn increases vascular stiffness and thus resulting in persistent hypertension.[18]

CONCLUSION

Madhumeha is a *Dhatwagni Vikruti Janya Vikara*. Disturbance in *Agni* leads to disturbed physiological functions and consequently manifestation of disease takes place along with the depletion of body tissues and lowered vitality. Hence, disturbance in *Dhatwagni,* particularly *Rasa, Rakta, Mamsa, Meda, Majja* and *Shukra Dhatwagni* can be understood from the *Avara* and *Madhyam* status of related *Dhatu Sara*. None of the *Dhatu* was in *Pravara* state in *Madhumeha* patients. *Madhyam Twak Sara, Rakta Sara, Mamsa Sara* and *Asthi Sara* were seen in diabetic patients of Stratum A. Maximum patients were of *Avara Meda Sara* in Stratum A followed by *Avara Shukra* and *Majja Sara.* Maximum patients were of *Avara Shukra Sara* followed by *Avara Meda Sara* in Stratum B. *Madhyam Mamsa Sara, Rakta Sara* and *Twak Sara* were seen in diabetic patients of Stratum B. On overall assessment, it can be inferred that maximum patients were of *Madhyam Sara* in Stratum A and maximum patients were of *Avara Sara* in Stratum B.

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