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REVIEW ARTICLE

Diabetes in Elderly and its Management from *Ayurvedic* and Modern Approach – A Review

Jyoti Kaushik[1]*, Ajay Kumar[2], Tina Singhal[3], Bharti Vats[4]

[1]PG Scholar, Department of Panchakarma, Government Ayurvedic College and Hospital, Varanasi, Uttar Pradesh, India.
[2]Assistant Professor, Department of Panchakarma, Government Ayurvedic College and Hospital, Varanasi, Uttar Pradesh, India.
[3]Assistant Professor, Department of Rachana Sharir, Government Ayurvedic College and Hospital, Varanasi, Uttar Pradesh, India.
[4]PG Scholar, Department of Prasuti Tantra Evum Stri Roga, Shri Krishna Government Ayurvedic College and Hospital, Kurukshetra, Haryana, India.

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ABSTRACT

Old age presents with serious challenges and changes for their own and their family. As the age grows, a person's body may no longer feel familiar, physical activity greatly reduced, memory starts going fade and person become full of many diseases. Diabetes is also one of them. About 40% population in India of diabetes is greater than age 65 years. Old patients having diabetes have high risk of occurrence of secondary complications such as fragility, cognitive impairment, traumatic fall, fractures, and other neuropathies. Hence, need of care and management is at most important for old age diabetes. Diabetes Type-2 may be somewhat similar to *Madhumeha* in Ayurveda. *Vagabhatta* has classified *Madhumeha* into two categories: These are *Dhatukshaya-janaya Madhumeha* and *Avarana-janya Madhumeha*. The factors which provoke *Vata* directly cause *Apatarparjanya Madhumeha* and the factors which provoke *Kapha* and *Pitta* cause *Santarpanajanya Madhumeha.* In the former type, patients are usually asthenic that can be correlated with diabetes mellitus Type I and in latter type patients are obese and can be equated with Type II diabetes mellitus. Hence*, Kapha* and *Pitta Shamak Aushadhi* and dietary restrictions are best for the management of elderly diabetes. The management of Type 2 Diabetes mellitus in older adults is complicated than younger individuals because of the frequent occurrence of multimorbidity, necessitating highly individualized approaches. Here, a complete review by Modern and Ayurvedic approach is taken to the assessment, nursing care, and medical treatment of diabetes in the elderly.

1. INTRODUCTION

Diabetes mellitus is a clinical syndrome characterized by hyperglycemia. Diabetes mellitus is the major cause of mortality in geriatric age called as a "Silent Killer" disease. One-third of the U.S. population over 65 years old has diabetes, and one-half of older adults have pre-diabetes.[1] Age and weight are both risk factors for the development of diabetes. It has been noted that in normal aging, there is a 2 mg/dL/decade rise in fasting plasma glucose, placing elderly patients at increased risk for the development of diabetes.[2] Furthermore, in older people, incidences of microvascular and macrovascular complications are more common. In Ayurvedic classics, 20 types of *Prameha* (Diabetes) are described and *Madhumeha* has been described as sub type of *Vatika Prameha. Madhumeha* is of two types as by *Acharya Vagabhatta*, these are *Dhatukshaya-janaya Madhumeha* and *Avarana-janya Madhumeha*. The factors which provoke *vata* directly cause *Apatarparjanya Madhumeha* and the factors which provoke *Kapha* and *Pitta* causes *Santarpanajanya Madhumeha*. *Santarpanajanya Madhumeha* is correlated with Type-2 diabetes mellitus. Under *Samprapti* (Pathogenesis) of *Santarpanjanya Madhumeha* or in *Sthula Madhumehi*, the vitiated *Kapha* and *Pitta* obstruct the path of *vata*, causing its provocation.[3] Changing diet habits, lifestyle change, unbalanced diet, excess fast food, and lack of exercise are the reasons behind development of growth of diabetes and its root is in urbanization. Old age presents with serious challenges and changes for their own and their family. Hence, a big care and management is very important in old age. Dietary restrictions, lifestyle modifications, and *Kapha Pitta Shamaka Aushadhi* (medicine), *and Rasayana aushadhi* (Rejuvenating medicines) play a key role in the prevention of elderly diabetes.

Corresponding Author:
Jyoti Kaushik,
Department of Panchakarma, Government Ayurvedic College and Hospital, Varanasi, Uttar Pradesh, India. Mobile: 9991709069.
Email: drkaushikjyoti@gmail.com

2. MATERIALS AND METHODS

It is purely literary review done after thoroughly studying classical texts such as *Charak samhita*, Sushrut Samhita, and articles of different scholars with modern genetics.

2.1. Relation of Glucose Metabolism and Age

As the age increases, both insulin secretion and insulin sensitivity are impaired. Various factors frequently encountered in old age contribute to, or are associated with, insulin resistance. These include central obesity, induced by various environmental factors, secretion of arginine vasopressin, or its C-terminal fragment (copeptin). Vitamin D deficiency and hypomagnesemia have also been incriminated in the pathogenesis of diabetes in the elderly. Insulin secretion is impaired with advancing age as well.[4] With each decade a 1–2 mg% increase in fasting blood glucose is noted and 15 mg% rise in postprandial or post-challenge, glucose levels is also seen after the third decade of life.[5] According to Sushruta, the excessive indulgence in the etiological factors related to *Prameha* results into *Aparipakva Vata, Pitta, Kapha,* and *Meda*, which further proceed downward through the *Mutravaha Srotasa* (Urinary tract) to get localized at *Basti Mukha* and thus leading to disease *Prameha*.[6] He described overindulgence of *Kapha vardhaka Aahar* (Food) and *Vihar* (Lifestyle) is the cause of *Prameha.*

3. CLINICAL FEATURES

Prabhootha mutrata (Polyuria), *Avila mutrata* (Turbid Urine), and *Medo dushti lakshanas* are the main symptoms of *Prameha*. Other symptoms include *Klama* (fatigue), *Karapada suptata* (numbness), *Karapada Daha* (burning sensation in hands and feets), and *Mukha shosha* (dryness of mouth).[7]

4. COMPLICATIONS OCCURRING DUE TO DIABETES IN ELDERS

- Alzheimer's disease
- Hearing impairment
- Eye damage(retinopathy)
- Kidney damage(nephropathy)
- Nerve damage(neuropathy)
- Cardiovascular disease.

5. DIAGNOSTIC CRITERIA OF DIABETES IN ELDERS

Diagnostic criteria of diabetes remain the same in almost all ages. When fasting glucose ≤126 mg/dL; symptoms of hyperglycemia and a random glucose equal to or <200 mg/dL; a 75-g oral glucose tolerance test with a 2 h value equal to or <200 mg/dL; or A1C≥ 6.5%. For diagnosis of diabetes, two abnormal test results on the same test sample are needed, or confirmation of the abnormal test must be done on another day, unless unequivocal symptoms of hyperglycemia are present.[8]

6. MANAGEMENT OF ELDERLY DIABETES

There are two types of *Prameha Rogi* according to Charaka Samhita, that is, *Sthula Pramehi* and *Krisha Pramehi*. In *Sthula Pramehi, Kapha* and *Pitta* are predominant and in *Krisha Pramehi, Vata* is predominant. Hence, for *Krisha Pramehi, Brihana chikitsa* is indicated and for *Sthula Pramehi Samshodhan Chikitsa* (purification methods) is indicated to expel out vitiated *Doshas*.[9] In old age patient, line of treatment is weight management and prevents comorbidities that occur due to diabetes. Following measures should be taken in diabetic patient:

6.1. Education of Patient

Any management plan should recognize diabetes self-management education as an integral component of care. A variety of strategies and techniques should be used to provide adequate education and development of problem management. Implementation of the management plan requires that each aspect be understood by the patient.

6.2. Healthy Eating

- Regular carbohydrate
- High in fiber
- Low in fat (particularly saturated fat)
- Low in added sugar
- Adequate energy/protein/vitamins/minerals

6.2.1. Recommended Composition of Diet for Diabetes is[10] [Table 1]

An obese diabetic should decrease the weight, till body weight is reduced to 5% below ideal weight and vice-a-versa in thin diabetic patient.

- Carbohydrates: 2–3 g/kg body weight to start with and then increase to the ideal level of 250 g.
- Protein: 1 g/kg to an adult, 2–3 g/kg to growing children
- Fat: The amount should be equal to that necessary to make up total calories.

6.3. Weight Management

It can be achieved through reduction in energy intake and increase in energy expenditure through exercise.

6.4. Exercise

Daily 30-min exercise including walking, cycling, weight lifting, and yoga improves insulin sensitivity and the lipid profile and lowers blood pressure. Following exercises are done by elderly patient:

6.4.1. Aerobic exercises

Aerobic exercise should be performed at least 3 days/week with no more than 2 consecutive days between bouts of activity because of the transient nature of exercise-induced improvements in insulin action.

6.4.2. Resistance exercise

It should be undertaken at least twice weekly on non-consecutive days, but more ideally 3 times a week in individuals with Type 2 diabetes, along with regular aerobic activities.

6.4.3. Yogasana

Various *Yogasana* are helpful in managing diabetes mellitus such as *Siddhasana, Shirshasana, Sarvangasana, Matsyasana, Ardha-matsyendrasana, Halasana, Chakrasana, Mayurasana, and Dhanurasa*.

6.5. Regular Assessment

Regularly assessment of blood pressure, lipid profile, renal function, eye examination, foot examination, and cognitive capacity.

6.6. Anti-diabetic Drugs in Modern [Table 2]

Table 2.

6.7. Single (*Aikal*) Ayurvedic herbal drugs

6.7.1. Babul (Acacia arabica)

Powdered seeds of babul when administered (2,3 and 4 g/kg body weight) to normal rabbits induced hypoglycemic effect by initiating release of insulin from pancreatic beta cells.[11]

6.7.2. Bilva (Aegle marmelos)

It prevents peak rise in blood sugar at 1 h in oral glucose tolerance test as found in studies.[12]

6.7.3. Onion (Allium cepa)

Onion has antioxidant and hypolipidaemic activity. Administration of a sulfur-containing amino acid from Allium cepa, S-methyl cysteine sulfoxide (200 mg/kg for 45 days) to alloxan-induced diabetic rats significantly controlled blood glucose as well as lipids in serum and tissues and normalized the activities of liver hexokinase, glucose 6-phosphatase, and HMG Co A reductase.[13]

6.7.4. Garlic (Allium sativum)

Garlic increases hepatic metabolism and also increases insulin release from pancreatic beta cells and/or insulin sparing effect hence helps in lowering high blood sugar.[14]

6.7.5. Nimba (Azadiracta indica)

It has anti-diabetic, anti-bacterial, antimalarial, antifertility, hepatoprotective, and antioxidant effects.[15]

6.8. Ayurvedic Formulations

Various ayurvedic formulations are described in Ayurvedic texts such as *Vasant Kusumakar Rasa, Trivanga Bhasma, Prameha Gaja Keshari Rasa, Yasad Bhasma, Vanga Bhasma, Tarkeshwara rasa, Harishankar rasa,* etc.

6.9. Rasayana Aushadhi

Acharya Sushruta explains that *Shilajit* should be taken after triturating with *Salsaradi gana kwatha*. After its digestion, patient should take *Jangala mamsa rasa yukta Anna*. He prescribes to take 1 Tula of *shilajatu*. He also advised *Suvaranamakshik, Rajatamakshika,* and *Tuvaraka Taila* in *Madhumeha.*[16]

7. DISCUSSION

Incidents of diabetes are increasing very rapidly as the age increases. Both *Ayurvedic* and Modern approach can help in preventing incidences of Type 2 diabetes mellitus in elder population. Clinicians should perform regular screening for pre-diabetes and diabetes in the older population and implement interventions to prevent complications associated with diabetes mellitus. Furthermore, healthy eating and lifestyle improvement help in reducing incidences of diabetes mellitus. The problems that older individuals with diabetes face, in contrast to younger people with the disease, include sarcopenia, frailty, and cognitive dysfunction. Such complications can lead to an increased risk of poor medication adherence, hypoglycemia (from certain medications), falls, and loss of independence in daily living activities. Many exercises and *Yogasana* remove toxins from the body through sweat and bring normalcy of *Tridoshas.*

7.1. Effect of Education of Patient

Diabetes education provides knowledge to change the patient's behavior, increasing their motivation to comply with therapeutic recommendations, improving their quality of life, establishing a partnership within the treatment process, preparing the patient for self-care, increasing their awareness of cardiovascular risk factors, and increasing their psychological resilience.[17]

7.2. Healthy Eating and Weight Management

Type 2 diabetes is most commonly associated with overweight or obesity and insulin resistance. Therefore, reducing weight and maintaining a healthy weight is a core part of clinical management. Low carbohydrate diet helps in reducing weight and thus also helps in the management of diabetes mellitus.

7.3. Exercises

Exercise can augment glucose disposal and improve insulin action. Muscle contraction and contraction-mediated skeletal muscle blood flow lead to glucose uptake through insulin-dependent and independent mechanisms. Thus, it helps in reducing blood sugar level.

7.4. Regular Assessment

Regular assessment of blood sugar prevents a person from complications arise due to increase blood sugar level.

7.5. *Rasayana Aushadhis*

Rasayana aushadhis (rejuvenating medicines) of *Ayurveda* brings rejuvenating power, is immuno-booster, and helps in bringing strength to patient.

8. CONCLUSION

The population of elderly patients with diabetes is growing very fast, with significant impact on population health and economics. Increasing rate of obesity and sedentary lifestyle will lead to a higher prevalence of diabetes among old persons. Also, risk of complications are very high as the age increases. Diabetes management in older adults requires careful assessment of clinical, functional, and psychosocial factors. By the help of both Ayurvedic and Modern aspect, an attempt should be taken to fight with diabetes mellitus. Here, the management of diabetes in elders by both views is described.

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Nil.

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Table 1: Recommended composition of diet for diabetes

Dietary constituent	Percentage of energy intake
Carbohydrate	45–60% Sucrose (up to 10%)
Fat (total)	<35% n-6 Polyunsaturated (<10%) n-3 Polyunsaturated (eat 1 portion/140gm oily fish once or twice weekly) Monounsaturated (10–20%) Saturated (<10%)
Protein	10–15% (do not exceed 1 g/kg body weight)
Fruits/vegetables	5 portion daily

Table 2: Anti-diabetic drugs in modern

Drug group	Mechanism of Action	Indications for use	Examples	Contraindications
Biguanides	Impairs glucose absorption by the gut and inhibit gluconeogenesis	Beneficial for obese Usually given with food	Metformin	In patients having impaired renal and hepatic function
Sulphonyl ureas	These are insulin secretagogues	Non-obese patients who fail to respond to dietary measures alone	Repaglinide nateglinide	In type-1 diabetes, allergy to meglitinides
meglitinides	Insulin secretagogues also called postprandial glucose regulators		Acarbose miglitol	Flatulence, Bloating, diarrhea
Alpha glucosidase inhibitor	Delay carbohydrate absorption in the gut by selectively inhibiting disaccharidases		Rosigitazone, pioglitazone	Sodium and fluid retention
thiazolidinediones	Improves glycemic control by improving insulin sensitivity	Second line therapy with metformin		