ISSN: 2475-5451

Review Article

International Journal of Diabetes & Metabolic Disorders

Diabetes Mellitus in the Elderly

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Submitted: 08 May 2020; **Accepted:** 18 May 2020; **Published:** 26 May 2020

Introduction

Prevalence of type 2 diabetes is expected to increase gradually with prolongation life expectancy. In a study conducted in the United States, it is found that the prevalence of type 2 diabetes increased from 16% to 23% between 1995 and 2004 [1]. According to current data, in the United States, among adults over 65 years of age 22% to 33% are diagnosed with diabetes. Older individuals with diabetes have higher rates of premature death, functional disability, accelerated muscle loss and coexisting illness, such as HTN, CAD, and stroke, compared to non-diabetic individuals. Elderly with diabetes also are at greater risk for several common geriatric syndromes, such as polypharmacy, cognitive impairment, urinary incontinence, falls, persistent pain, depression, and sarcopenia. These conditions may adversely affect older adult's diabetes self-management [2].

Diabetes in elderly is distinct from diabetes in younger people and approach to therapy should be different. This is especially true in those who have functional dependence, frailty, dementia or who are at end of life. In elderly with diabetes and multiple comorbidities and/or frailty, strategies should be used to strictly prevent hypoglycaemia, which include the choice of antihyperglycemic therapy and less stringent glycated haemoglobin (A1C) target.

Diagnosis and Screening

Classification and diagnosis of diabetes, prediabetes and metabolic syndrome, glycated haemoglobin (A1C) can be used as a diagnostic test for type 2 diabetes in adults. Unfortunately, normal aging is associated with a progressive increase in glycated haemoglobin (A1C), and there can be significant discordance between glucose-based and A1C-based diagnosis of diabetes in this age group [3]. Further studies are required to define the role of A1C in the diagnosis of diabetes in the elderly, other tests may need to be considered in some older people, especially where the elevation in A1C is modest (i.e. 6.5% to 7.0%). The screening with both fasting plasma glucose and an A1C in older patients is recommended, as they are complementary.

Diabetic Characteristics in the Elderly Population

Glucose intolerance increases progressively with aging and the characteristic feature of diabetes in elderly patients is especially postprandial hyperglycemia. Decrease in beta-cell-compensating capacity with advancing age, leads to insulin resistance and it appears as a postprandial hyperglycemia in the elderly. Therefore, the prevalence varies according to the tests used for diagnosis. One third of the individuals who are tested with A1c or fasting plasma glucose (FPG) will remain undiagnosed [4]. In comparison to adults with diabetes diagnosed in middle age, retinopathy is more prominent in late-onset diabetes mellitus, and interestingly there is no difference in prevalence of cardiovascular disease (CVD) or peripheral neuropathy according to age at onset.

Glycaemic Targets for T2DM in Elderly patients (Table 1)

Recent international guidelines have focused on functional status as key factor in determining the target A1C in older people with diabetes. As functional independence is lost and/or life expectancy shortens, the benefit of lower glycaemic targets is diminished and the risk of hypoglycaemia increases [2, 5, 6].

Table 1: Showing the target HbA1c and BP in geriatric patients with diabetres mellitus as per American Diabetes Association (ADA) and International diabetes federation (IDF)

Measure	ADA	IDF
A1C	**Healthy:** <7.5% **Complex/Intermediate:** <8.0% **Very Complex/Poor Health:** <8.5%	**Functionally Independent:** 7.0-7.5% **Functionally Dependent:** 7.0-8.0% **Sub-level Frail:** <8.5% **Sub-level Dementia:** <8.5% **End of Life:** avoid symptomatic hyperglycemia
Blood Pressure	**Healthy:** <140/80 mmHg **Complex/Intermediate:** <140/80 mmHg **Very Complex/Poor Health:** <150/90 mmHg	**Functionally Independent:** <140/90 mm Hg **Functionally Dependent:** <140/90 mmHg **Sub-level Frail:** <150/90 mmHg **Sub-level Dementia:** <140/90 mmHg **End of Life:** strict BP control may be necessary.

Treatment of T2DM in Elderly

The treatment of T2DM in older patients must be individualized not only to ensure effectiveness, but also to maximize patient safety and quality of life. Guiding principles before deciding a treatment regimen should include an assessment of multiple factors: patient risk for atherosclerotic disease and diabetes-related comorbidities, medication history, functional status to determine if the patient is able to independently manage his/her T2DM, presence of depression and/or cognitive impairment, history of urinary incontinence and/or falls, severe hypoglycemia or attenuated awareness of hypoglycemia, and duration of diabetes, among others.

Life Style Modification: Diabetes in the aging population is associated with reduced muscle strength, poor muscle quality, and accelerated loss of muscle mass, resulting in sarcopenia. Diabetes is also recognized as an independent risk factor for frailty. Frailty is characterized by decline in physical performance and an increased risk of poor health outcomes due to physiologic vulnerability to clinical, functional, or psychosocial stressors. So, optimal nutrition and protein intake is recommended for older patients; regular exercise, including aerobic activity and resistance training, should be encouraged in all older adults who can safely engage in such activities.

Pharmacologic Therapy: In older adults at increased risk of hypoglycemia, medication classes with low risk of hypoglycemia are preferred. Overtreatment of diabetes is common in older adults and should be avoided. Deintesification (or simplification) of complex regimens is recommended to reduce the risk of hypoglycemia, if it can be achieved within the individualized HBA1c target.

Oral Antidiabetic Drugs (Table 2)

According to the most recent ADA guidelines, metformin (a biguanide) is considered first-line therapy in T2DM [7]. Given its low hypoglycemic risk profile and low cost, metformin may also be beneficial in older adults. However, limitations to its use include side effects (predominantly gastrointestinal), weight loss, which may preclude its use in frail patients, and a small risk of lactic acidosis in patients with renal dysfunction. Sulfonylureas are also cost-effective, but are limited by hypoglycemia that may be problematic for older

Table 2: Depicting Various Oral Antidiabetic Medications

Class of Medication	Mechanism of Action	Hypoglycemia Risk	Concerns in Elderly	Benefits in Elderly
Biguanide	Reduce hepatic glucose production	Low	Renal disease, heart failure, liver disease due to risk of lactic acidosis	High efficacy Low cost Modest weight loss
Sulfonylureas (glimepiride, glyburide, glipizide)	insulin secretagogue	High	caution in liver disease	high efficacy low cost
Meglitinides (nateglinide, repaglinide)	insulin secretagogue	Low	frequent administration caution in liver disease	low risk of hypoglycemia compared to sulfonylureas
Glucagon-like peptide-1 Agonists (liraglutide, exenatide)	insulin secretagogue increase incretin effect	Low	gastroparesis pancreatitis injectable therapy	Weight loss
Dipeptidyl-peptidase IV Inhibitors (sitagliptin)	insulin secretagogue increase incretin effect	Low	pancreatitis modest reduction in HbA1c expensive	Weight neutral
Thiazolidinediones (pioglitazone,	increase insulin sensitivity	Low	increase fracture risk renal and liver disease, heart failure weight gain and fluid retention	Increases insulin sensitivity
Alpha-glucosidase inhibition (acarbose)	reduce carbohydrate absorption	Low	renal, liver disease and Malabsorptive syndromes gastrointestinal side effects common	Possible reduction in cardiovascular events.
Sodium-glucose co-transporter-2 Inhibitors (empagliflozin)	increase urinary glucose excretion	Low	increased risk of UTI and yeast infection increased urinary frequency limited efficacy with chronic kidney disease expensive	Cardiovascular benefit Reduction in blood pressure
Amylin replacement (pramlintide)	amylin replacement	Low	gastro paresis multiple daily injections modest HbA1c reduction	Weight loss

Patients, especially those with reduced glomerular filtration rate or poor appetite. The shorter duration glipizide and the glinides (repaglinide and nateglinide) may be preferable in this scenario; but overall the risk of prolonged hypoglycemia with all sulfonylureas and glinides makes their use largely inadvisable in the elderly population. Alpha-glucosidase inhibitors such as acarbose specifically target post-prandial hyperglycemia and have low hypoglycemia risk; however, gastrointestinal side effects, frequent dosing, and relatively low efficacy may limit their applicability in some older patients. Thiazolidinediones (pioglitazone and rosiglitazone) improve sensitivity to insulin predominantly by binding to the PPARγ receptor. However, they have been associated with weight gain, edema, heart failure, bone fractures, and bladder cancer, precluding their use in certain older adults. Dipeptidyl peptidase-IV (DPP-4) inhibitors (sitagliptin, linagliptin, saxagliptin, and alogliptin), carry limited hypoglycemic potential, and are generally well tolerated. This suggests that they may be useful for older patients; but applicable prospective studies are limited. A recent retrospective observational study focused on the safety and tolerability of the DPP-4 inhibitors in type 2 diabetics aged 65 years and older. Researchers reviewed the medical records of 431 patients with type 2 diabetes (mean age of 74 years) and demonstrated a trend towards less mild hypoglycemia among those taking DPP-4 inhibitors as compared to those taking non-DPP-4 inhibitors (3% vs.

8%, p = 0.062). Additionally, patients on DPP-4 inhibitors showed a reduction in HbA1c from approximately 8.3% to 7.4%, consistent with previous literature in younger subjects. Among patients receiving DPP-4 inhibitors identified in this study, most patients were taking sitagliptin (74.3%), followed by vildagliptin (21.8%) and saxagliptin (3.9%) [8].

Insulin

Insulin therapy can be used successfully in select older adults with T2DM, and generally have similar efficacy and hypoglycemia risk compared to younger patients. The biggest limitation is the potential for hypoglycemia and this risk must carefully be assessed in an individual older patient.

Conclusion

In older adults, treatment is determined by quality of life, comorbidities and life expectancy. An acceptable rather than an ideal HbA1c should be the aim and treatment that is associated with minimal risk of hypoglycaemia is prefered.

References

1. Zhang X, Decker FH, Luo H, Geiss LS, Pearson WS, et al. (2010) trends in the prevalence and comorbidities of diabetes mellitus in nursing home residents in the United States: 1995-2004. J Am Geriatr Soc 58: 724-730.
2. Kirkman MS, Briscoe VJ, Clark N, Hermes Florez, Linda B Haas, et al. (2012) Diabetes in older adults. Diabetes Care 35: 2650-2664.
3. Lipska KJ, De Rekeneire N, Van Ness PH, Johnson KC, Kanaya A, et al. (2010) Identifying dysglycemic states in older adults: Implications of the emerging use of hemoglobin A1C. J Clin Endocrinol Metab 95: 5289-5295.
4. Szoke E, Shrayyef MZ, Meissing S, Woerle HJ, Timon W van Haeften, et al. (2008) effect of aging on glucose homeostasis: accelerated deterioration of beta–cell function in individuals with impaired glucose tolerance. Diabetes care 31: 539-543.
5. International Diabetes Federation (2013) Managing older people with type 2 diabetes global guideline. Brussels, Belgium: International Diabetes Federation (IDF).
6. Mathur S, Zammitt NN, Frier BM (2015) Optimal glycaemic control in elderly people with type 2 diabetes: What does the evidence say? Drug Saf 38: 17-32.
7. Standards of medical care in diabetes-2015: summary of revision. Diabetes care 38.
8. Adie Vijoe, Claire L Meek, Roger Gadsby et al. (2013) The tolerability and safety of DPP-4 inhibitors for the treatment of older people with type 2 diabetes mellitus: an observational study. The British Journal ofDiabetes and Vascular Disease 13:187-191.