Diabetes in Elderly Populations: A Narrative Review

Katu Amina H.

School of Natural and Applied Sciences Kampala International Uganda

ABSTRACT

Diabetes mellitus is an increasingly prevalent chronic condition among elderly populations worldwide, driven largely by demographic aging and improved life expectancy. Older adults with diabetes represent a heterogeneous group with diverse clinical profiles, comorbidities, functional capacities, and care needs. Age-related physiological changes, including progressive insulin resistance, β-cell dysfunction, and altered glucose homeostasis, complicate both the presentation and management of diabetes in this population. Furthermore, atypical symptomatology, multimorbidity, polypharmacy, and heightened vulnerability to hypoglycemia and frailty pose significant clinical challenges. This narrative review synthesizes current evidence on the epidemiology, pathophysiology, diagnostic considerations, and management strategies for diabetes in elderly populations. Particular emphasis is placed on geriatric-specific concerns, including cognitive and functional impairment, hypoglycemia risk, health-related quality of life, and the impact of comorbidities. Pharmacologic and non-pharmacologic interventions are discussed within the context of individualized, patient-centered care, highlighting the importance of balancing glycemic targets with safety and functional preservation. The review also explores emerging health system models and multidisciplinary care approaches designed to address the complex needs of older adults with diabetes. Despite the growing disease burden, elderly individuals remain underrepresented in clinical research, resulting in limited evidence to guide optimal care. Future directions emphasize the need for flexible treatment frameworks, integration of geriatric assessments, and a paradigm shift toward healthy longevity and quality-of-life–focused outcomes. Addressing these gaps is essential to improving diabetes care and outcomes in aging populations.

Keywords: Diabetes mellitus, Elderly population, Geriatric diabetes, Frailty and comorbidity, and Quality of life.

INTRODUCTION

The number of elderly individuals with diabetes is growing relentlessly around the globe. In 1980, approximately 200 million people worldwide had diabetes; by 2015, the number had multiplied to 422 million, and about half of this population was aged 60 years and older [2]. With the rapid increase in life expectancy due to medical advancements and technological improvements, older adults constitute a distinctive cohort whose problems, fears and priorities may differ from those of younger populations [1]. The unique pathophysiology of aging further complicates management of diabetes in the elderly, an area that remains poorly studied. Due to complications associated with diabetes and the accumulation of other comorbidities, the average life expectancy of people with diabetes is generally 5 to 10 years shorter than that of the general population [2]. Consequently, defining an appropriate therapeutic scheme for older adults with diabetes is essential yet challenging. Specific factors such as the age at onset and duration of diabetes, the time remaining until death, the number of coexisting diseases, and overall health status must all be carefully considered [3].

Epidemiology of Diabetes in the Elderly

According to the World Health Organization, 1.5 million deaths were attributed directly to diabetes in 2019, and forecasts reveal that the incidence of diabetes could reach 629 million in 2045[4]. Diabetes in older populations raises more concerns than in younger adults because it affects life expectancy and raises the risk of disability. Aging is associated with an increased incidence of diabetes [3]. More than 60% of people with diabetes are older

than 60 years, and long-standing diabetes in older populations increases the prevalence of vascular and neurologic complications, leading to disability, institutionalization, and death [1].

Pathophysiology and Clinical Characteristics in Aging

Aging is correlated with changes in physiological and biochemical systems, body composition, and the regulation of glucose homeostasis, increasing the risk of developing type 2 diabetes [1]. Age-related diabetes results from multiple abnormalities, including decreased insulin secretion, decreased insulin-stimulated glucose disposal in muscle, and increased hepatic glucose output [2]. Exaggerated glucose intolerance and increased hemoglobin A1c are observed even in early phases of the disease. The progressive decline in β-cell function with advancing age is influenced by cumulative years and glucose exposure [7]. In elderly persons with long-standing diabetes, a small deterioration in either component of the insulin-glucose axis can impair metabolic control, increase both fasting and postprandial glucose concentrations, and accelerate micro- and macro-vascular complications [4]. Maintaining euglycemia therefore has particular relevance in older patients, with all efforts directed to diagnosis and treatment.

Diagnostic Considerations in Older Adults

While the diagnosis of diabetes is generally straightforward, certain aspects deserve closer examination in older adults [7]. Many older people with diabetes present atypically; therefore, the time-honored clinical picture of polyuria, polydipsia, lethargy, and other symptoms that show up in youth may be absent [6]. In some, it may be more subtle and include mild hyperglycemia, early morning fasting hyperglycemia, deteriorating glycemic control in those previously well controlled, or more frequent falls. Even careful glucose measurement may be misleading; falsely reassuring random glucose, HbA1c, or self-monitoring blood glucose can occur [1, 4, 3].

Management Approaches in Geriatric Diabetes

Diabetes management should emphasize prevention of geriatric syndromes, hypoglycemia, and neurocognitive decline. Elderly individuals constitute a heterogeneous population, and treatment must be tailored to each person's needs through comprehensive interdisciplinary care [2]. A diabetes treatment strategy for older patients should address clinical and social, economic, and health factors. Therapy must be individualized based on each person's characteristics and circumstances, considering attitudes, hypoglycemia-related risks, disease duration, life expectancy, comorbidities, and social support [2]. Age alone should not justify therapeutic inertia risks linked to hyperglycemia persist even when life expectancy is limited. Complexity of comorbidities, polypharmacy, advancing age, and diverse living environments necessitates careful medication management under the principle "start low + go slow." Clarity regarding overall treatment goals is always essential [1]. Diabetes management among older adults must accommodate specific considerations, including the high malnutrition prevalence, which constrains medication options. Glycemic goal-setting likewise requires special attention to balance hyperglycemia and hypoglycemia risks. Attainment of optimal glucose control may mitigate cognitive decline, prevent physical disability, and sustain lower-extremity function [4]. The broad spectrum of health status and comorbidities, combined with varying vulnerability to hypoglycemia, necessitates personalized treatment plans that routinely adjust glycemic objectives. Managing oxidative stress, inflammation, and micronutrient levels is also critical. Individualized approaches based on continuous glucose monitoring and assessments of patient-specific factors are thus recommended for effective long-term diabetes care in older adults [4].

Pharmacologic Therapy

The clinical management of Type 2 diabetes in the elderly involves a wide variety of pharmacological and non-pharmacological therapies [5]. A collaborative health care intervention which engages pharmacists both as medication managers and as patient-education resource providers is suggested for this age group. This characterisation of health management reflects the need for a framework to accommodate elderly patients exhibiting complex pharmacological requirements, such as those related to diabetes. Older patients are at elevated risk for numerous geriatric syndromes [6]. Age-related pharmacokinetics and pharmacodynamics are altered across all major drug categories affecting diabetes management. The broad lexicon often associated with the geriatric population is appended to the word "diabetes" to reflect the growing epidemiology and act as a reminder of needed management pillars, such as socio-community factors [8].

Non-pharmacologic Interventions

Older adults represent a unique subset of individuals with diabetes and can be differentiated from the adult cohort in terms of pathophysiology and presentation [2]. At the same time, the elderly are also more likely to have multiple comorbidities (e.g., stroke, ischemic heart disease), necessitating a multidisciplinary health care team to provide coordinated and comprehensive care [5]. Diabetes care for seniors, therefore, requires consideration for conditions other than the disease itself. Dietary modifications have only a modest impact on glycemic control; consultation with a dietitian can aid in planning a balanced diet that facilitates weight management and glucose maintenance [3].

Hypoglycemia Risk and Safety Monitoring

Treatment of diabetes has gained substantial prominence amongst older adults with varying degrees of model sophistication and theoretical underpinning [5]. Younger adults experience an easier time navigating the multitude of treatment options available due to the thorough consideration for the side effects, risks, and long-term safety of treatment regimens presented in medicines label as well as the myriad of secondary effects experienced for chronic illness management [3]. Unfortunately, the continued lack of clear established guidelines for older adults and the numerous complex dynamics commonplace in treating elderly patients hinder their ability to select treatment options as easily. Together, the high prevalence of diabetes and the accompanying complexity of suitable treatment options for older adults compound the importance of understanding diabetes and its related complexities in this demographic [2].

Comorbidity and Polypharmacy in Elderly Patients with Diabetes

Diabetes is a chronic illness, characterized by high blood glucose levels, which requires daily self-management. In older adults, the prevalence of and the risk of acquiring diabetes increase significantly, this creates significant challenges towards self-management and adherence to pharmacological treatments [5]. Elderly patients with diabetes are frequently affected by other comorbidities, leading to increased complications and disability 7. As the amount of prescribed medications for elderly patients with chronic illnesses increases, the risk of mal-adherence, drug–drug interaction and drug–disease aggravation increases [7]. Thus, the high prevalence and the complexity of diabetes management highlighted the need for a better understanding of this pathology in elderly populations.

Diabetes is increasing among the elderly population, as is the number of geriatric patients affected by multiple chronic illnesses [3]. Geriatric patients with diabetes mellitus frequently present multiple comorbidities, such as cardiovascular, genitourinary, neurological, musculoskeletal, dental and psychiatric disorders, which primarily affect the metabolic and endocrine systems [4]. The onset of these conditions often predisposes patients to the development of diabetes, increasing both disability and mortality risks and the burden of geriatric patients. Geriatric patients affected by diabetes not only find the high variability in the integrity of the larger systems significantly complicating the management of glucose even a factors complexity for good quality of life but also face several psycho-social problems and experience the media increasingly negatively influencing the patients' health status. Still, knowledge of the interconnectedness across the systems and management techniques aimed at the same complex in the metabolic system can give important benefits to patient quality of life [3].

Functional and Cognitive Implications

Older adults have additional needs because they face unique age-related changes and may have multiple physical and mental health conditions, known as geriatric syndromes, which complicate diabetes care. Nearly a quarter of U.S. adults between 65 and 74 years of age and 5% of those older than 75 are thought to have cognitive impairment [2]. Risk factors for geriatric syndromes include older age, baseline cognitive and functional impairment, and impaired mobility, making diabetes-related functional assessment essential [6]. Two functional dependencies specifically linked to higher mortality and institutionalization include the inability to perform instrumental activities of daily living (iADLs) such as managing finances or using public transportation and the inability to perform basic activities of daily living (ADLs), such as bathing or dressing[5]. Neurocognitive dysfunction and its associated syndromes are key geriatric syndromes in this population. Screening is recommended annually, with the aim of early detection.

Health-Related Quality of Life and Patient-Centered Outcomes

Diabetes imposes a considerable burden on health-related quality of life (HRQoL) among older adults; however, few studies have specifically investigated the contribution of aging-related factors to diabetes-related HRQoL impairment among this population [6]. Furthermore, quality-of-life studies in older populations considering existing diabetes complications remain scant [8]. Health-related quality of life (HRQoL) is a key indicator of well-being that has gained essential recognition in the management of diabetes. HRQoL represents the patient's own assessment of their health status and encompasses physical (e.g. self-care, mobility, usual activity, pain), mental (e.g. anxiety, depression), and social domains (e.g. social activity). In persons with diabetes, the HRQoL may also reflect how much diabetes affects these different life domains [9]. For example, individuals with diabetes may experience a perceived deterioration of their HRQoL linked to diabetes complications, or they may feel that the disease itself, even in the absence of any complication, influences their HRQoL [2].

Health Systems and Care Models for Geriatric Diabetes

Health systems and clinical care models specifically target the needs of elderly patients with diabetes to support their complex multisystem disease and multimorbidity [4]. The proposed strategies include: (1) collaborative efforts to raise awareness and understanding of diabetes among older people and their families; (2) recommendation of a responsible and deliberate normalization of high blood-glucose levels to reduce the risk of associated diabetes complications; and (3) the promotion of an appropriate model of care namely, the diabetes in

transition (D-TiC) model for older patients with diabetes [5]. The D-TiC model consists of an umbrella visual component that recognizes not only the presence of diabetes but also of aging, with all its implications multiple diagnoses, drug treatment, risk of functional decline, psychosocial aspects and the multiplicity of caregivers which together make diabetes a transitional disease[5]. Health systems and clinical care models targeted specifically to elderly patients with diabetes support their complex multisystem disease and multimorbidity [6]. Systems and models proposed include collaborative efforts to raise awareness and understanding of diabetes among older people and their families; responsible and deliberate normalization of hyperglycaemia to reduce the risk of associated diabetes complications; and promotion of the diabetes-in-transition care model for older patients with diabetes [4]. The diabetes-in-transition model comprises an umbrella visual component recognizing not only the presence of diabetes but also of aging with all its implications, such as multiple diagnoses, drug treatment, risk of functional decline, psychosocial aspects and the multiplicity of caregivers making diabetes a transitional disease [7].

Gaps in Knowledge and Future Directions

The increasing number of older adults worldwide, forecasted to rise from about 1 billion in 2019 to approximately 2.1 billion by 2050, warrants further understanding of diabetes and its impact on the aging population. Because the elderly population is set to increase further on, diabetes prevalence in this group requires constant research attention [7]. The severity of the disease is influenced by several factors including physiological age, health status, past medical history and diabetes reappearance [8]. These factors are crucial for establishing personalized treatment goals. The elderly population varies in terms of physical and physiological health, which affects diabetes prevalence as well. Frail and disabled elderly individuals account for more than half of the older adult cohort. More than half of the older adults globally experience some form of frailty, and diabetes was found to significantly increase the likelihood of frailty. Therefore, understanding diabetes within the elderly population requires knowledge of frailty in this demographic. A paradigm shift towards the notion of "healthy longevity" and appropriate medicine will facilitate improvement. This shift indicates the necessity of knowing the aging status of older adults when managing diabetes [10]. Flexibility in managing diabetes treatment plans is essential. Shifting the dominant consideration away from glucose control to patient requirements and preferences allows for the avoidance of Friday medication issues, successful reduction of unsuitable anti-diabetic medication and triply unsustainable case burdens. Consequently, upgrading the flexibilities for treatment adjustments based on health condition transformations remains significant [9]. The elderly population varies in terms of physical and physiological health, which affects diabetes prevalence as well. Frail and disabled elderly individuals account for more than half of the older adult cohort. More than half of the older adults globally experience some form of frailty, and diabetes was found to significantly increase the likelihood of frailty. Understanding diabetes within the elderly population requires knowledge of frailty in this demographic. The paradigm shift towards the notion of "healthy longevity" and appropriate medicine gathered most attention. This shift indicates the necessity of knowing the aging status of older adults when managing diabetes [11-12]. Flexibility in managing diabetes treatment plans is essential. Shifting the dominant consideration away from glucose control to patient requirements and preferences allows for the avoidance of Friday medication issues, successful reduction of unsuitable anti-diabetic medication and triply unsustainable case burdens [7]. Consequently, the upgrading of flexibilities for treatment adjustments based on health condition transformations remains significant [13-18].

CONCLUSION

Diabetes in elderly populations presents a complex and evolving challenge that extends beyond glycemic control to encompass functional ability, cognitive health, comorbidity management, and overall quality of life. Aging-related physiological changes, combined with the high prevalence of multimorbidity and polypharmacy, necessitate individualized and flexible treatment strategies tailored to each patient's health status, life expectancy, and personal preferences. This narrative review underscores that older adults with diabetes are not a homogeneous group and should not be managed using uniform therapeutic targets. Instead, comprehensive geriatric assessment, vigilant monitoring for hypoglycemia and integration of multidisciplinary care models are essential to optimizing outcomes. Patient-centered approaches that prioritize safety, functional independence, and well-being over strict metabolic targets are particularly important in frail and cognitively impaired individuals. As the global population continues to age, the burden of diabetes among older adults will rise substantially. Addressing existing gaps in evidence, particularly through the inclusion of elderly individuals in clinical research, is critical for advancing care. Future efforts should focus on developing adaptable care models that support healthy longevity, improve health-related quality of life, and ensure sustainable, equitable diabetes management for aging populations.

REFERENCES

1. Dardano A, Penno G, Del Prato S, Miccoli R. Optimal therapy of type 2 diabetes: a controversial challenge. Aging (Albany NY). 2014 Mar 26;6(3):187.

2. Ugwu OP, Ogenyi FC, Ugwu CN, Basajja M, Okon MB. Mitochondrial stress bridge: Could muscle-derived extracellular vesicles be the missing link between sarcopenia, insulin resistance, and chemotherapy-induced cardiotoxicity?. Biomedicine & Pharmacotherapy. 2025 Dec 1;193:118814.
3. Kalra S, Dhar M, Afsana F, Aggarwal P, Aye TT, Bantwal G, Barua M, Bhattacharya S, Das AK, Das S, Dasgupta A. Asian best practices for care of diabetes in elderly (ABCDE). The Review of Diabetic Studies: RDS. 2022 Jun 30;18(2):100.
4. Paul-Chima UO, Nneoma UC, Bulhan S. Metabolic immunobridge: Could adipose-derived extracellular vesicles be the missing link between obesity, autoimmunity, and drug-induced hepatotoxicity?. Medical Hypotheses. 2025 Sep 28:111776.
5. Longo M, Bellastella G, Maiorino MI, Meier JJ, Esposito K, Giugliano D. Diabetes and aging: from treatment goals to pharmacologic therapy. Frontiers in Endocrinology. 2019 Feb 18;10:45.
6. Du YF, Ou HY, Beverly EA, Chiu CJ. Achieving glycemic control in elderly patients with type 2 diabetes: a critical comparison of current options. Clinical Interventions in Aging. 2014 Nov 18:1963-80.
7. Grossman S. Management of type 2 diabetes mellitus in the elderly: role of the pharmacist in a multidisciplinary health care team. Journal of multidisciplinary healthcare. 2011 May 25:149-54.
8. Ugwu OP, Ogenyi FC, Ugwu CN, Ugwu MN. Gut microbiota-derived metabolites as early biomarkers for childhood obesity: A policy commentary from urban African populations. Obesity Medicine. 2025 Sep 1;57:100641.
9. Ugwu OP, Okon MB, Alum EU, Ugwu CN, Anyanwu EG, Mariam B, Ogenyi FC, Eze VH, Anyanwu CN, Ezeonwumelu JO, Egba SI. Unveiling the therapeutic potential of the gut microbiota–brain axis: Novel insights and clinical applications in neurological disorders. Medicine. 2025 Jul 25;104(30):e43542.
10. Longo M, Bellastella G, Maiorino MI, Meier JJ, Esposito K, Giugliano D. Diabetes and aging: from treatment goals to pharmacologic therapy. Frontiers in Endocrinology. 2019 Feb 18;10:45.
11. Ho HY, Chen MH, Lou MF. Exploring the experiences of older Chinese adults with comorbidities including diabetes: surmounting these challenges in order to live a normal life. Patient preference and adherence. 2018 Jan 30:193-205.
12. Ugwu CN, Ugwu OP, Alum EU, Eze VH, Basajja M, Ugwu JN, Ogenyi FC, Ejemot-Nwadiaro RI, Okon MB, Egba SI, Uti DE. Medical preparedness for bioterrorism and chemical warfare: A public health integration review. Medicine. 2025 May 2;104(18):e42289.
13. Shamshirgaran SM, Stephens C, Alpass F, Aminisani N. Longitudinal assessment of the health-related quality of life among older people with diabetes: results of a nationwide study in New Zealand. BMC endocrine disorders. 2020 Mar 5;20(1):32.
14. Paul-Chima UO, Ugwu CN, Alum EU. Integrated approaches in nutraceutical delivery systems: optimizing ADME dynamics for enhanced therapeutic potency and clinical impact. RPS Pharmacy and Pharmacology Reports. 2024 Oct;3(4):rqae024.
15. Ugwu CN, Ugwu OP, Alum EU, Eze VH, Basajja M, Ugwu JN, Ogenyi FC, Ejemot-Nwadiaro RI, Okon MB, Egba SI, Uti DE. Sustainable development goals (SDGs) and resilient healthcare systems: Addressing medicine and public health challenges in conflict zones. Medicine. 2025 Feb 14;104(7):e41535.
16. Aro AK, Karjalainen M, Tiihonen M, Kautiainen H, Saltevo J, Haanpää M, Mäntyselkä P. Glycemic control and health-related quality of life among older home-dwelling primary care patients with diabetes. Primary care diabetes. 2017 Dec 1;11(6):577-82.
17. Ongesa TN, Ugwu OP, Ugwu CN, Alum EU, Eze VH, Basajja M, Ugwu JN, Ogenyi FC, Okon MB, Ejemot-Nwadiaro RI. Optimizing emergency response systems in urban health crises: A project management approach to public health preparedness and response. Medicine. 2025 Jan 17;104(3):e41279.
18. Kumar P, Sinha AK, Kumar A, Alam ME. Barriers and facilitators of providing standard of care diabetes management at primary care level in geriatric population. Journal of family medicine and primary care. 2022 Oct 1;11(10):6451-7.