Geriatric diabetes
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With 6.6 million adults with diabetes, Pakistan ranks the 10th largest country in the global diabetes list, and 2nd largest in the Middle East and North Africa (MENA) region. Of these 6.6 million people, 1.57 million are in the 60-79 years age group, representing nearly one fourth of the patient population. At a global level, of the 371 million people with diabetes, 128 million, i.e., one third, are aged 60-79 years old. As life expectancy increases due to improvements in preventive and curative medical care, this figure is certain to rise.

Health care professionals who care for people with diabetes at times do not realize the unique biopsychosocial features that make geriatric diabetes different from diabetes in younger adults. The difference in physiology, anatomy, and biochemistry of the elderly, their psychological makeup and social environments often lead to unique clinical presentations of geriatric diabetes. These factors warrant individualized therapeutic strategies for diabetes in the geriatric age group.

This paper explores the pathophysiological and clinical features of geriatric diabetes, while suggesting a practical therapeutic approach. It takes into account the heterogeneous nature of geriatric diabetes, which requires patient centered, rather than algorithmic approach the need for treatment. It highlights the need for 'logical empiricism' (empirical therapy, based on physician’s logic, and patient’s circumstances), rather than a pure evidence-based medicine in geriatric diabetes.

Challenges of Geriatric Diabetes:
Elderly people with diabetes have lesser life expectancy, which is sometimes used as an excuse not to treat the condition adequately. Cognitive function weakens with worsening glycaemic status, and impacts therapeutic outcomes in multiple ways. Elderly patients are more prone to cognitive dysfunction, and also to acute complications (hypoglycaemia, hyperglycaemia) chronic complications (hypertension, heart disease, neuropathy, nephropathy), as well as comorbid disease (cataract, arthritis, hyponatraemia). These medical or biological factors impact choice of, acceptance of, and efficacy of, various treatment modalities. Hypoglycaemia, precipitated by multiple risk factors (Table) is a major concern in the elderly, and needs to be prevented by use of appropriate therapy. Increasingly, a greater number

<table>
<thead>
<tr>
<th>Risk factors for hypoglycemia in the elderly.</th>
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<tbody>
<tr>
<td><strong>Life style related</strong></td>
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<tr>
<td>◆ dietary error</td>
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<tr>
<td>◆ excessive physical activity</td>
</tr>
<tr>
<td>◆ alcohol intake</td>
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<tr>
<td><strong>Drug related</strong></td>
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<tr>
<td>◆ wrong dosage</td>
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<td>◆ wrong time of administration</td>
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<tr>
<td>◆ wrong technique of administration</td>
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<tr>
<td><strong>Medical disease related</strong></td>
</tr>
<tr>
<td>◆ renal dysfunction</td>
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<tr>
<td>◆ hepatic dysfunction</td>
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<tr>
<td>◆ gastro intestinal dysfunction/ malabsorption</td>
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<tr>
<td><strong>Endocrine related</strong></td>
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<tr>
<td>◆ hypo-pituitarism</td>
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<td>◆ hypo-thyroidism</td>
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<td>◆ hypo-adrenalism</td>
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<tr>
<td><strong>Nervous system related</strong></td>
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<tr>
<td>◆ cognitive impairment</td>
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<tr>
<td>◆ autonomic neuropathy</td>
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<td>◆ gastrointestinal neuropathy</td>
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of elderly with diabetes live alone, or as a couple, without children or other social support. This problem is common in developed countries, where the younger generation has migrated in search of work. Individualized treatment strategies are needed for this group, in whom facilities for care, rather than finance is the major challenge.

Diagnosis of Diabetes:
In the elderly, postprandial glucose values rise faster (15mg% per decade), as compared to fasting glycaemia (1-2mg% per decade). Thus, using fasting glucose alone as a diagnostic tool may underestimate diabetes in this population.

While universal screening is not recommended, one should encourage opportunistic screening in the elderly, i.e., checking blood glucose while performing routine blood tests or investigating for any other illness.

Type 3 Diabetes Mellitus:
Type 3 diabetes is the term proposed for syndrome of diabetes and Alzheimer’s disease. It has been discovered...
that insulin is produced in the brain as well, to keep brain cells viable. If insulin secretion is reduced, brain cells may die, and Alzheimer’s disease may be precipitated. This theory is supported by preclinical and clinical evidence, which suggest that Alzheimer’s disease is a neuroendocrine syndrome. Possible specific therapeutic strategies include statins, glitazones, and GLP-1 analogues.

**Non Pharmacological Therapy:**
Non-drug therapy, including diabetes education, diet and physical activity, as well as stress management, is equally important for the elderly. One should assess and understand the psychosocial environment of the individual patient before planning therapy. An elderly man who is dependent on his busy son to bring him to the clinic cannot be expected to return for frequent follow up. A senior lady whose daughter-in-law does not cooperate may not be able to adhere to well-meaning dietary advice. Geriatric patients without income, financially dependent on their family may not afford multiple drugs or complicated therapeutic regimes.

While such socio-environmental issues are important in every person with diabetes, they carry more significance in our social milieu. We cannot hope to manage diabetes effectively without taking these factors into consideration. A simple acknowledgement of the challenges faced by the geriatric patient with diabetes, even if the physician is powerless to change them, can do wonders.

Non-pharmacological therapy includes therapeutic patient education, and lifestyle modification, in the form of dietary advice, physical activity prescription, and stress management.

Diabetes education for the elderly should include, among other issues, hypoglycaemia, foot care, and stress management. Dietary prescription should follow the Eight A’ s of Dietary Prescription. Food supplements are very helpful. It must be remembered that the elderly need different nutritional advice from that given to obese people with diabetes. Fruits, milk, eggs and supplemented flour use should be encouraged, to provide essential nutrients and prevent constipation. Physical activity options may be limited for the elderly, due to various physiological and social constraints. An individualized exercise plan should be prescribed for each patient, using isotonic exercises, carried out in familiar, relaxed surroundings. The elderly often feel that their illness controls them, instead of they themselves managing their medical condition. Physicians should endeavor to create a sense of self-confidence among their patients with diabetes, by practicing shared decision making, and ensuring patient empowerment.5 Group get-togethers are extremely helpful, just as for mothers of children with Type 1 diabetes. In our set up, the physician has to take the initiative and motivate geriatric patients to form a discussion group to share best practices (personal communication - Dr Fatema Jawad).

**Oral Hypoglycaemics:**
Metformin is the drug of choice for all persons with diabetes, unless contraindicated or not tolerated. It is a calorie restriction mimetic, and should be avoided in frail, underweight, malnourished or anorexic individuals. One should watch for gastrointestinal symptoms and for Vitamin B12 deficiency. A word of caution on the physiological rise in creatinine in the elderly is necessary. The dose of metformin has to be adjusted, or the drug stopped, in patients with high serum creatinine, or low creatinine clearance. Lactic acidosis is a rare side effect, more often encountered in the elderly, or those with impaired renal function.

The dipeptidyl dipeptidase-IV inhibitors (DPP-IV inhibitors) are a natural choice in the management of elderly diabetes. These drugs-sitagliptin, vildagliptin and linagliptin-are suitable for all type 2 diabetes, irrespective of duration of diabetes or built of body. Secretagogues such as glibenclamide should be avoided in geriatric practice, in view of the tendency to cause hypoglycaemia. Glipizide, gli-clazide and glimepiride are considered safe, but should be prescribed only to patients who follow regular meal patterns. Safer secretagogues include repaglinide, which has equivalent HbA1c lowering properties as the sulfonylureas, without the risk of hyperglycaemia. This molecule is suitable for patients who skip meals, and can be used as monotherapy or in combination with metformin and/or insulin.

The sole thiazolidinedione, pioglitazone, can be used in the elderly if metformin is not tolerated. One should watch for fluid retention, a higher risk of osteoporotic fractures, and an unsubstantiated risk of bladder cancer in patients on pioglitazone. Alpha-glucosidase inhibitors such as acarbose and voglibose are considered safe in the elderly.2

**Insulin:**

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**Box: The Eight A’s of Dietary Prescription.**
- Accurate
- Appropriate
- Available/accessible
- Acceptable
- Attractive
- Achievable
- Affordable
- Absorbable/digestible.
Insulin remains the most cost effective treatment for people with diabetes, irrespective of age. Modern insulin therapy, using insulin analogues, has the added advantage of safety and tolerability, with the convenience of easy-to-use injection devices. Various insulin regimes are available for use in the elderly. Attention should be paid to the appropriate use of syringes, needles and pens for insulin injection, using the optimal technique and site.

Premixed Insulin:
Premixed insulin is used in Pakistan, as it has the benefits of efficacy, safety, and tolerability, along with improved quality of life. It can be prescribed as once daily or twice daily injections, with an option to intensify the same insulin later. Older individuals require lesser dose in general (0.1-0.2 U/kg/day), with a relatively slower pace of dose adjustment, e.g. once a week. A practical protocol for premixed insulin use is described in the South Asian Consensus Guidelines for management of geriatric hyperglycaemia. The use of once-daily premixed insulin, with the meal associated with maximal hyperglycemia, is an attractive initiation option for people with diabetes.

Basal Insulin:
Basal insulin, administered once daily, is a simple option for insulin initiation in patients with fasting hyperglycaemia, and relatively lower postprandial rises in glucose. Basal insulin can be administered at any time of the day, requires comparatively less monitoring, and is associated with lower risk of hypoglycaemia. It is suitable for elderly patients who cannot or are not willing to inject more frequently. However, basal insulin cannot be intensified to achieve adequate glycaemic control in most patients with postprandial hyperglycaemia.

Basal-Bolus Insulin:
Considered the ideal insulin replacement regime, a basal-bolus insulin plan is difficult to adhere to, especially in elderly patients with limited cognitive, visual and sensory-motor function. In geriatric population, basal-bolus insulin may be indicated, as in undercurrent infection, acute coronary syndromes, or critical illness. Initial doses should be conservative (0.1U/kg/day) to avoid hyperglycaemia.

Modern Insulin Analogues:
The modern insulin analogues have added benefits safety and tolerability, as compared to traditional insulin preparations. Premixed analogues such as aspart 30:70, aspart 50:50, lispro 25:75 and lispro 50:50 can be administered immediately before or after meals, and have the advantage of controlling both fasting and post meal hyperglycaemia. Basal analogues, i.e., insulin detemir and glargine, can be used alone or in combination with rapid acting analogues. Both are well tolerated, but glargine is associated with weight gain and a purported risk of malignancy. The rapid acting analogues - aspart, lispro, and glulisine - are useful in outdoor and indoor settings where intensive control is needed.

Non-Insulin Injectables:
Glucagon-like peptide-1 agonists (GLP-1 agonists) - liraglutide, injected once daily, and exenatide, prescribed twice daily, can be used in the elderly. However, not much data is available on their use.

Conclusion
Subtle differences between elderly people, and younger adults, impact the pathophysiology, diagnosis and management of diabetes. Physicians should be aware of these issues and approach geriatric patients in an appropriate manner. Emphasis must be on safety and tolerability of therapy, delivered in a patient — centered, and humane, sensitive way. A few words of respect and encouragement, added to the pharmacological prescription, ensures closer patient-provider bonding, and leads to better therapeutic outcomes.

References