

With increasing longevity of the world's population, increasing numbers of diabetics are living longer. In addition, more and more diabetics are being first diagnosed at a later age, often above the age of 65. Hence, there exists now a high prevalence and incidence of diabetes in the elderly (mainly type 2) and questions about the diagnosis and treatment of diabetes in this subgroup merit special consideration.

EPIDEMIOLOGY OF DIABETES AND ITS COMPLICATIONS IN THE ELDERLY

According to NHANES III, the third National Health and Nutrition Examination survey¹, the prevalence of diabetes in the age group of 60 and beyond was found to be about 25% in the American population with almost a similar prevalence of IGT. The incidence rate in the age group 45 and older was approximately five per 1,000².

Macrovascular disease is the main complication in elderly diabetes. In UKPDS, the mean age of participants was 53, but there is no reason to think that extrapolation of its results to an older age group would be invalid. This is supported by various observational studies that poor glycemic control in the elderly contributes to increased risk of cardiovascular and cerebrovascular events^{3,4}.

Microvascular complications also contribute significantly to morbidity and mortality in the elderly. Renal failure, diabetic retinopathy and peripheral neuropathy all take their toll and result in disability with poor quality of life. Elderly diabetics are 2 to 3 times more likely to have disability and 1.5 times more likely to have Activities of daily living (ADL) limitations those without diabetes⁵. Elderly diabetics may be more likely

to have an elevated 2 hour GTT reading than the fasting plasma glucose. As GTTs are not routinely done in clinical practice, a high index of supervision is needed and even mildly elevated fasting blood glucose should be evaluated with a GTT.

TREATMENT GOALS

Treatment goals for elderly diabetics are not very much different than those for younger diabetics. The difference is that elderly diabetics represent a broad spectrum of disease not only in terms of their diabetes and the presence or absence of complications but also in terms of their co-morbidities, disabilities and functional status. Hence, treatment regimens need to be highly individualized. Evidence based guidelines have been developed for the treatment of elderly diabetics⁶. They recommend screening and management of various 'geriatric syndromes', i.e. polypharmacy, cognitive impairment, falls, urinary incontinence and depression (in addition to treating the diabetes). When an individual takes more than 10 medications, the risk of drug-drug interaction is almost certain (100%). Hence, special care must be taken to prescribe the minimum number of medications in order to avoid such an iatrogenesis scenario in elderly patients who have poor physiologic reserve. A functional assessment should also be done in order to assess how effectively the individual can conduct his activities of daily living. All these have a bearing on the choice and mode of treatment. The 'frail' elderly patient needs different treatment goals including the management of symptomatic hyperglycemia and the scrupulous avoidance of hypoglycemia rather than aiming for stringent control.

TREATMENT OF SYMPTOMATIC HYPERGLYCEMIA

Elderly diabetics have poor physiologic reserve and hence are more susceptible to hyperglycemia, glycosuria and polyuria. Falls, fatigue, dizziness, mental confusion weight loss can result from the glycosuria and polyuria. Patients with multiple disabilities, chronic disease, cognitive impairment or reduced life expectancy are considered frail elderly. Elimination of glycosuria (blood glucose less than about 200 mg/dl) is an important goal specially in the frail elderly. Other deleterious effects of overt hyperglycemia include constant catabolic state, visual problems due to changes in the refraction of lens, and an increased predisposition to infections. For all the above reasons hyperglycemia above 200 mg/dl should be treated even in the frail elderly diabetic in order to avoid immediate complications and maintain a reasonable quality of life (Table 1).

MANAGEMENT OF MACROVASCULAR AND MICROVASCULAR COMPLICATIONS

Prevention and management of microvascular and macrovascular complications does not differ signifi-

cantly from the young diabetic except in the case of the frail elderly. The robust elderly diabetic should be treated as aggressively as the young diabetic on account of the increased lifespans that we are seeing today.

DIET

Dietary therapy must be individualized, with the aim of achieving optimal glycemic, blood pressure and lipid goals. Weight loss is beneficial in obese subjects but some of the elderly are undernourished (specially the institutionalized) rather than over nourished. In these individuals, caloric supplementation is required. Also the logistics of preponing food, shopping, finances, etc. need to be organized.

EXERCISE

It has clearly been shown that exercise (in addition to diet) prevents diabetes (the Diabetes Prevention Program). Exercise has multiple benefits on hypertension, hyperlipidemia and heart disease. Even frail elderly patents benefit from resistance and aerobic exercises⁷.

Thus exercise remains the cornerstone of diabetes prevention and management in the elderly. The exercise

Table 1: Role of various oral agents and insulin in the management of diabetes in the elderly

<i>Treatment Modality</i>	<i>Advantage</i>	<i>Disadvantage</i>
I. ORAL MEDICATIONS	Ease of administration	1. Polypharmacy, (decreased compliance) 2. Increased prevalence of contraindications in the elderly.
A. Sulphonylureas	1. Potent 2. Inexpensive 3. Familiarity with use over decades	1. Hypoglycemia (with or without hepatic or renal dysfunction) 2. Polypharmacy
B. Biguanides (Metformin):	1. Minimal Hypoglycemia (in the absence of renal or hepatic dysfunction) 2. Weight Loss.	1. Contraindicated in congestive heart failure, liver disease and renal disease (common in elderly) 2. Gastrointestinal side effects
C. α Glucosidase inhibitors	1. Good for postprandial hyperglycemia (common in elderly) 2. Minimal hypoglycemia (as monotherapy)	1. GI side effects
D. Thiazolidinediones	1. Reduce insulin resistance 2. Moderately potent	1. Potential for weight gain 2. Contraindicated in congestive heart failure
E. Meglitinides	1. Short acting, good for postprandial hyperglycemia 2. Can be used in renal insufficiency 3. Reduced risk of hypoglycemia.	
F. Combination oral agents	1. Improved Control 2. May be easier and/or safer than multidose insulin in certain situations	1. Increased hypoglycemia risk 2. Adverse drug effects due to polypharmacy 3. May worsen GI symptoms
II. INSULIN THERAPY	1. Flexibility of regimen, achieving glycemic goals 2. Reduces polypharmacy 3. Can be used in patients with co-morbidities like hepatic or renal dysfunction	1. Requires home glucose monitoring 2. Complexity of regimen (multiple injections/day) 3. Risk of hypoglycemia

prescription needs to be individualized specially for patients with cardiovascular disease or the frail elderly.

Risk of hypoglycemia is increased in some elderly patients on insulin therapy with the following:

- Impaired vision
- Impaired manual dexterity
- Inability to do home glucose monitoring
- Impaired cognitive function
- Poor family support.

Thus, insulin solutions for the elderly must involve proper selection of patients, diabetes education and the involvement of friends, family and care givers.

In conclusion, diabetes is a self-managed disease but for the elderly it can be a family managed disease. Involvement of friends, family and caregivers as well as a good social support system is an important part of diabetic management in the elderly.

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