

The Spectrum of Diabetes Mellitus in Young Population: A Concern

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INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder, the incidence of which is increasing exponentially in the entire world. Previously, this disease was considered as an adult disease, but as per the current trend, it is affecting a greater number of young people as well. More and more of young individuals are affected and if not detected early, they may develop both micro and macrovascular complications at a younger age with a lot of burden on the health system, affecting the productivity and economy of the nation. Early detection and treatment will prevent these complications and improving their productivity and disease burden. But practically, most of these individuals are not diagnosed and in those diagnosed also the treatment is not optimum. In the current scenario, despite having lots of information regarding DM, still undetected cases of DM are very high across the globe and even in young patients as well. It is the need of the hour to address the current challenges of DM in the young population by focusing on its early detection and management.

BURDEN OF DIABETES MELLITUS IN YOUNG ADULTS

Diabetes mellitus (DM) is a new challenge in young adults as it is becoming increasingly prevalent in this cohort.¹ Obesity, signs of insulin resistance and prevalence of cardiovascular (CVD) risk factors such as hypertension and dyslipidemia are very commonly associated with type 2 diabetes mellitus (T2DM) patients. The young age group with such type of high-risk conditions requires urgent attention to avoid macro and microvascular complications.¹ Globally, 463 million population is living with diabetes mellitus, wherein china has the highest number of DM population, followed by India with 77 million. From the current scenario, with the growth of 51%, it is anticipated that by 2045, the DM population will be 629 million globally; wherein currently, 75% are from working-age between 30-55 years. It is an estimation that 5.8-6.4 years of life are lost in diabetes at the age of 50 years.^{1,2} T2DM is not only highly prevalent in adults, but also increasing in youth.¹ In the USA, its incidence is increased by 7.1% annually in the young population of less than 19 years. Even in Asian countries like Japan, its incidence is continuously increasing in children in the age group of 13-15 years and T2DM is dominating type 1 diabetes mellitus (T1DM) even in this age group.³⁻⁵ The early onset DM develops fast and remains more cumbersome than a late onset of the disease, leading to early morbidity and reduced quality of life. When compared to type 1 diabetes or T2DM in adults, T2DM in the young population are at a higher risk of developing early and severe microvascular and cardiovascular complications. Some risk factors in young adults like obesity, family history, and ethnicity are similar to adult DM. Additionally, metabolic risk factors for T2DM like high blood pressure, high cholesterol, impaired glucose tolerance, and metabolic syndrome, are also associated with obesity.⁶

DETECTION OF DIABETES MELLITUS IN YOUNG POPULATION IS A BIG CHALLENGE

Insulin resistance is a pathological hallmark for T2DM and its development at an early age will harbingers the onset of diabetes in the young population. Other metabolic consequences of insulin resistance can result in hyperglycaemia, hypertension, dyslipidaemia, visceral adiposity, hyperuricemia, elevated inflammatory markers, endothelial dysfunction, and prothrombic state and may be associated with metabolic conditions like obesity, acanthosis nigricans, polycystic ovarian syndrome (PCOS), non-alcoholic fatty liver disease (NAFLD); which are considered as significant risk factors for the development

of cardiovascular diseases. Some of these complications may appear before the detection of T2DM and probably suggest impaired glucose metabolism in the body.^{7,8} Low level of suspicion of DM at that age leads to missing the diagnosis by the clinician. Though patients with T1DM typically present with profound and rapid onset hyperglycaemia related osmotic symptoms or even ketoacidosis, sometimes it is very challenging to differentiate between type 1 DM and type 2 DM in young adults. Incorrect diagnosis leads to life-threatening complications; especially when T1DM patient is treated with oral diabetes medication rather than insulin. Similarly, misdiagnosing T2DM as T1DM can result in mental trauma, agony to the family, avoiding the benefit of insulin sensitizers and unnecessary insulin therapy which may be prolonged resulting in metabolic complications like hypoglycaemia and weight gain.¹ Sometimes special biochemical tests may be required to diagnose and guide the clinical management. In T2DM, serum insulin and C peptide concentration will remain persistently normal or high which is very unusual in T1DM. But sometimes there may be an overlap of insulin and c peptide levels between T1DM and T2DM initially, making the differentiation difficult.⁹ Other types of diabetes like MODY can also occur at this age. Transcription factor diabetes (HNF4A, HNF1A), MIDD (maternal inherited diabetes and deafness), calcific pancreatic diabetes (type 3c) and permanent neonatal diabetes (PNDM) can also present at this age and these possibilities should be kept in mind while dealing with hyperglycaemia in the young. A careful history of the age of onset of hyperglycaemia can give clue. The age of onset is in early childhood and adolescence in type 1 DM and before the age of 6 months in PNDM. Family history of DM will be common in type 2DM, MODY and history of diabetes in mother is present in MIDD. Acanthosis nigricans is seen in patients with type 2 DM whereas MIDD patients are lean. The diagnostic evaluation for young adults even for children and adolescents is based on common symptoms of diabetes mellitus such as polydipsia, polyuria, and unexplained weight loss plus routine laboratory blood glucose measurement like fasting blood glucose, postprandial blood glucose level and HbA1c.¹⁰ High glucose levels are seen in patients with type 1 DM, HNF1A-MODY, PNDM. C peptide levels are low in type 1 DM, MODY, PNDM and type 3c DM. Presence of beta cell autoantibodies like glutamic acid decarboxylase (GAD) autoantibodies will confirm the diagnosis of T1DM. Ultrasound (US) scan of the abdomen showing ductal calcification and stones is seen in type 3c DM. Genetic analysis for HNF1A, HNF4A and HNF1B mutations can confirm maturity-onset diabetes of the young (MODY). So, careful evaluation of the patient with a good history, examination and investigations will clinch the diagnosis.

CONTROLLING DIABETES MELLITUS IN YOUNG ADULTS IS CHALLENGING

Appropriate education and life-style modification certainly delays the new onset of DM and helps in reaching the targets and also reduces the severity of complications. But following lifestyle measures is difficult and much more problematic for the young diabetics to follow the regular guideline recommendations due to age, puberty and peer group influences.

Compared to the elderly population, controlling glycaemic level in young adults is a major challenge. It is observed that control remains poor both within and beyond 5 years of diagnosis in young adults.⁶ In the management of T2DM, glycaemic control with HbA1c level <6.5% is an utmost important goal in most of the patients. Along with appropriate lifestyle modification, optimum weight control will help to reach the desired target with medication.¹¹ Physical exercise like aerobic activity, sports alone or in combination with diet can reduce weight, blood lipid level, elevated blood pressure and also helps to maintain mental health as well.¹² For pharmacological management approach, most of the drugs are investigated in adults with less number of research studies in young. Metformin is the most appropriate starting point for any age group with T2DM. The results of the Treatment Options for Type 2 Diabetes in Adolescents and Youth (TODAY) study suggest that monotherapy with metformin was associated with durable glycaemic control in children and adolescents.¹³ Apart from this in young age group patients, currently, many newer oral antidiabetic agents are introduced which not only control glucose level but also reduces cardiovascular mortality like sodium-glucose cotransporter-2 (SGLT2) inhibitors, glucagon-like peptide 1 (GLP-1) analogues, dipeptidyl peptidase-4 (DPP-4) inhibitors. Metformin is always considered as first-line therapy if there are no contraindications, but after metformin or along with metformin if the patient has any marked CV risk factor, then SGLT2 inhibitors, GLP-1 analogues are preferred agents. Treatment with these agents may increase the cost of therapy but proper counselling of patient may improve adherence to this therapy. Alternatively, along with metformin other agents like sulfonylureas, meglitinides, thiazolidinediones, α -Glucosidase inhibitors, DPP-4 inhibitors are preferred options. In case of uncontrolled glucose with adequate antidiabetic drugs and HbA1c level more than 9%, treatment with insulin or its analogues are preferred to manage DM.¹⁴ Bariatric surgery is emerging as a viable treatment option in young individuals with type 2 diabetes and evidence has been accumulating that it is safe and effective in obese adolescents.¹⁵

CONCLUSION

Type 2 DM which is thought to be more common in the elderly, is now detected more and more in young adults reaching epidemic proportions. These people are at high risk for development of diabetes-related complications such as chronic kidney disease (CKD) and cardiovascular disease (CVD) early in the disease process with high morbidity and mortality at a relatively young age. Development of these complications at a productive age will make the nation and society crippled. So, it is imperative to screen the target population, and proper preventive education and optimum treatment modalities are to be applied to deal with the oncoming epidemic. However, there are many gaps and lack of evidence for intervention to either optimize glycaemic control or to address CV risk factors. There is a need for sufficient scientific data and focused guideline-based approach for management of DM in young population for having a balanced socio-economic development in future.

DECLARATION OF CONFLICTING INTERESTS

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