

Research Article

Introduction to the Special Issue on Type 2 Diabetes Mellitus (T2DM) in Pediatric Patients

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Introduction

Type 2 Diabetes Mellitus (T2DM) in children and adolescents is a recent chronic disease facing the medical community in many countries [1-5]. Recent data from the United States (US) has demonstrated an incidence of 8.1 per 100 000 person years in the 10- to 14-year age group and an incidence of 11.8 per 100 000 person years in the 15- to 19-year group. In this survey, the highest rates were found in descending order from American Indian, African American, Asian/Pacific Islander and Hispanic youth, and the lowest incidence occurred in non-Hispanic white youth [1, 3]. A recent Canadian survey has demonstrated a similar incidence of T2DM in youth <18 years of age of 1.54 per 100 000 children per year [2-3]. In this survey, 44% of children with new onset T2DM were of Aboriginal origin, 25% Caucasian, 10.1% Asian, 10.1% African/Caribbean and the remaining of other or mixed ethnic origin (2-3). About 45% of new cases of diabetes mellitus (DM) in youth were estimated to be T2DM. The SEARCH for Diabetes in Youth study (SEARCH) has shown that in the US alone in 2010, over 20 000 individuals below 20 years of age had T2DM. Moreover, the survey predicted that this number may increase up to 30 000 by 2020 and up to 84 000 by 2050 [4].

Considering that T2DM in pediatric patients is a relatively new clinical entity, Healthcare professionals (HCP) have had little chance to generate clinical experience in the management of hyperglycaemia and risk factors in pediatric patients with T2DM. Furthermore, very few clinical trials exist to guide clinical practice in T2DM pediatric patients. Therefore, current management guidelines rely largely on data from adult studies and expert consensus [5-6]. However, information regarding adults with T2DM may not always be applicable to youth with the disease.

Also because T2DM in pediatric patients is strongly associated with pediatric obesity current management guidelines rely also on those from pediatric obesity [6-9]. Unfortunately, the literature on the management and treatment for both T2DM and its complications in the pediatric population remains limited. The lack of information about pediatric T2DM may influence the care delivered by HCP. It is hoped that with a well-organised approach in the treatment and prevention that we would be able to stop the onset and progression of this complicated disease. This special issue aims to highlight in a single document what is known about pediatric T2DM and to try to feed most gaps as possible in our understanding of this metabolic disorder.

The review does not address in details all the complications associated with T2DM in this population. Minimal inferences are also made on the metabolic syndrome; a disorder closely associated with T2DM. All the articles mentioned address mostly T2DM. This special issue does not address research about T1DM, except when comparisons with T2DM are required. Similarly, it does not address research about T2DM in adults, but sometimes it is necessary to better document the topics discussed.

In the second article, I will first give you the definition of pediatric T2DM. Then, I will discuss the risk factors and consequences associated with T2DM in pediatric patients. Subsequently, in the third article, I will describe the approaches to prevent T2DM in this age group that are highly comparable to those used to prevent pediatric obesity already discussed in some of my previous publications and books (8-11). The "6As" model for counselling and motivational interviewing methods in primary care clinical practice validated in obese pediatric patients are two effective methods that can certainly be useful to manage T2DM in pediatric patients and has not been discussed yet. Therefore, these methods will be described in details in the fourth article of this special issue on the management of T2DM in pediatric patients. There are only 2 pharmacologic molecules that can be used to treat T2DM in pediatric patients. These 2 molecules will be discussed in the fourth article as well as few other potential molecules that are still not authorized in children for the treatment of T2DM. Therefore, in the subsequent article (article number 5), it seems reasonable to discuss briefly the barriers and potential solutions surrounding the clinical research with pediatric patients suffering from T2DM. The article number 6 is probably the most practical; it is composed of a case report using questions and answers in order to consolidate the information discussed in the previous articles of this special issue. Similarly, pediatric T2DM is difficult to treat, and around 50% of patients treated with Metformin will become less responsive to this drug and this may be due to clinical characteristics of the patients as well as the molecular characteristics of the drug itself used to treat T2DM. That is why I consider useful to introduce in the article number 7 a relatively new concept in this area; this concept is the pharmacogenomics or pharmacogenetics of T2DM with the ultimate goal of having a personalized treatment for those patients i.e., being able to provide a treatment that will be more efficient, more secure and more adapted to a specific patient with T2DM. The fructose metabolism is completely different than the sucrose

metabolism and it is associated with a higher risk of obesity and cardiovascular disorders. That is why I decided in the article # 8 to make the point on the issue of fructose to ensure that all the readers are on the same footing regarding this issue. In the article number 9, I discussed the issue of hypoglycemia unawareness. Although this disorder is more frequent in older patients, there is a possibility to get this disorder even in adolescents especially in those that are not highly concerned by their symptoms of diabetes or decide to ignore them, which is frequent in the follow-up of T2DM adolescent patients. Therefore, it seems highly appropriate to already discuss this concept in the context of this document. Finally, I put some energy at finding what should be the best definition of metabolically healthy but obese (MHO) patients as we have observed that many definitions of this concept exist in adults. In this final short review (article # 10), after considering that having diabetes at a young age and for a longer period of time is associated with a very high risk of cardiovascular disorder later in life, I found that the definition of MHO in pediatric patients should be as restrictive as adult patients in order to reduce obesity-associated complication.

For this special issue, I first did a literature search, which searches primarily from January 2006 to December 2016. This research in children and adolescents focuses on the following themes: Pediatric T2DM, primary care, diet, physical activity, sedentary behavior, behavior modification, prevention, T2DM management, fructose, hypoglycemia unawareness, pharmacogenomic and pharmacogenetic. I selected the most recent articles to better reflect current knowledge. Selected documents come from Scopus, Medline and the database of systematic consultation such as Cochrane Reviews.

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