Introduction

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defect in insulin secretion, insulin action or both. The chronic hyperglycemia of diabetes is associated with long term damage, dysfunction and failure of various organs, especially the eyes, kidneys, nerves, heart and blood vessels ***(ISPAD, 2014).***

Type1 diabetes can be distinguished from type2 by autoantibody testing. The C-peptide assay, which measures endogenous insulin production, can also be used ***(WHO, 2013).***

It is an autoimmune disease that is characterized by the destruction of insulin producing beta cells in the pancreatic islets, although it is not yet known what initiate the autoimmune process it is likely that both genetic background and environmental factors contribute to the disease process. Dietary factors have been implicated in the etiology of type1 diabetes as well as in initiating the autoimmune process that leads to clinical disease ***(Norris et al., 2007).***

The autoimmune response towards beta cells, involving an expansion of autoreactive CD4+ T helper cells and CD8+ T cells, autoantibody-producing Bcells and activation of theinnate immune system ***(Bluestone et al., 2010).***

After starting treatment with insulin a person's insulin requirement reduce, This is believed to be due to altered

immunity and is known as the "honeymoon phase" ***(Aly et al., 2009).***

Lack of care can be lethal and administration of insulin is essential for survival. Insulin therapy must be continued indefinitely and does not usually impair normal daily activities. Untreated, diabetes can cause many complications; acute complications include diabetic ketoacidosis and nonketotic hyperosmolar coma. Serious long-term complications include heart disease, stroke, kidney failure, foot ulcers and damage to the eyes Furthermore, complications may arise from low blood glucose caused by excessive treatment ***(WHO, 2013).***

Diabetes mellitus type 1 account for 5% of cases of diabetes ***(American Diabetes Association, 2014).***

In Egypt, the incidence of T1DM is 8/100000 in children under the age of 15years ***(Slotesz, 2006).***

Globally, the number of people with DM type 1 is unknown, although it is estimated that about 80,000 children develop the disease each year. Within the United States the number of affected persons is estimated at one to three million ***(Chiang et al., 2014).***

The development of new cases vary by country and region; the lowest rates appears to be in Japan and China with approximately 1 person per 100,000 per year; the highest rates

are found in Scandinavia where it is closer to 35 new cases per 100,000 per year ***(Kasper et al., 2005).***

Type1 diabetes mellitus and other chronic diseases in children are well known to adversely affect linear growth and pubertal development growth impairment reported in diabetic patients is dependant on abnormalities in physiological bone growth and corresponds to abnormalities of the growth hormone- insulin- like growth factor1 (GH-IGF-1) axis ***(Chiarelli et al., 2004).***

Results from recent research suggest that people with type1 diabetes may neglect precise self-care due to social fear related to fear of hypoglycemia ***(Di Battista et al., 2009).***

Type 1 diabetics may also neglect physical activity due to reduced perceived positive effects as well as increased perceived negative aspects of that activity ***(Plotnikoff et al., 2009).***

Health education

Is the profession of educating people about health ***(Mckenzie et al., 2009).***Areas within this profession encompass enviromental health, physical health, social health, emotional health, intellectual health, and spiritual health ***(Donatelle, 2009).***

It can be defined as the principle by which individuals and groups of people learn to behave in a manner conducive to

the promotion, maintenance, or restoration of health. However, as there are multiple definitions of health, there are also multiple definitions of health education. The Joint Committee on Health Education and Promotion Terminology of 2001 defined Health Education as "any combination of planned learning experiences based on sound theories that provide individuals, groups, and communities the opportunity to acquire information and the skills needed to make quality health decision" ***(American Journal of Health Education, 2001).***

The World Health Organization defined Health Education as "comprising of consciously constructed opportunities for learning involving some form of communication designed to improve health literacy, including improving knowledge, and developing life skills which are conducive to individual and community health" ***(World Health Organization, 1998).***

Type 1 diabetes is managed by insulin replacement and balancing of diet and exercise in order to maintain glycemic control and prevent the occurrence of complications. Glycemic control, which is linked directly to complication rates ***(Haller et al., 2005).***

In order to effectively manage diabetes, education about components of management such as blood glucose monitoring, insulin replacement, diet, exercise, and problem solving strategies must be delivered to the patient. Education is

important both at diagnosis, where there is usually no knowledge base and patient and family are given the basic skills for controlling the disease ***(Gage et al., 2004).***

Quality of life has been shown to be lower in those with diabetes compared with similar individuals without diabetes ***(Maddigan et al., 2005).***

Definitions of study concepts:

Type1 diabetes mellitus: Diabetes mellitus type 1 (also known as type1 diabetes, or T1DM; formerly insulin-dependent diabetes or juvenile diabetes) is a form of diabetes mellitus that results from the autoimmune destruction of the insulin-producing beta cells in the pancreas. The subsequent lack of insulin leads to increased blood and urine glucose. The classical symptoms are polyuria, polydipsia, polyphagia and weight loss ***(Cooke and Plotnick, 2008).***

Health education: Constructed opportunities for learning involving some form of communication designed to improve health literacy, including improving knowledge, and developing life skills which are conducive to individual and community health ***(World Health Organization, 1998).***

Adherence: Adherence describes the degree to which a patient correctly follows medical advice. Most commonly, it refers to medication or drug compliance, but it can also apply to other situations such as medical device use, self-care, self-directed

exercises, or therapy sessions. Both the patient and the health-care provider affect adherence, and a positive physician-patient relationship is the most important factor in improving adherence ***(World Health Organization, 2003).***

Quality of life: is the general well-being of individuals and societies, outlining negative and positive features of life. It observes life satisfaction, including everything from physical health, family, education, employment, wealth, safety, security to freedom, religious beliefs, and the environment ***(Barcaccia and Barbara, 2013)***. QOL has a wide range of contexts, including the fields of international development, healthcare, politics and employment. It is important not to mix up the concept of QOL with a more recent growing area of health related QOL (HRQOL) ***(Bottomley and Andrew, 2002).***

Aim of the Work

To determine the degree of achievement the presentable objectives of health education of diabetic children &their families on adherence to the health education program, control of diabetes & improvement of their quality of life.

Type 1 Diabetes Mellitus

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defect in insulin secretion, insulin action or both. The chronic hyperglycemia of diabetes is associated with long term damage, dysfunction and failure of various organs, especially the eyes, kidneys, nerves, heart and blood vessels ***(ISPAD, 2014).***

Hyperglycemia is the landmark of this metabolic syndrome and is the parameter most closely monitored to make diagnosis and to judge therapy. The vast majority of cases of diabetes fall into two broad etiopathogenic categories. In type 1 diabetes, the cause is an absolute deficiency of insulin secretion. Individuals at increased risk of developing this type of diabetes can often be identified by serological evidence of an autoimmune pathologic process occurring in the pancreatic islets and by genetic markers ***(ADA, 2013a).***

Epidemiology of Childhood Type 1 Diabetes

In most western countries, type 1 diabetes accounts for over 90% of childhood and adolescent diabetes, although less than half of individuals with type 1 diabetes are diagnosed before the age of 15 years ***(Thunander et al., 2008)***.

Type 2 diabetes is becoming more common in adolescents, particularly in the peripu- bertal period, and accounts for a

significant proportion of youth onset diabetes in certain at risk populations ***(Liese et al., 2006).***

Prevalence of type 1 diabetes in children

It is estimated that annually some 76,000 children aged less than 15 years develop type 1diabetes worldwide. Of the estimated 480,000 children with type 1 diabetes, 24% come from the South-East Asian Region, but the European Region, where the most reliable and up-to-date estimates of incidence are available, comes a close second (23%).

The continued mapping of global trends in incidence and prevalence of type 1 diabetes in all age groups, through use of data from existing and new registries, is thus important, and in conjunction with other scientific research may provide a logical basis for intervention studies and future primary prevention strategies which must be the ultimate goal ***(IDF, 2010)***.

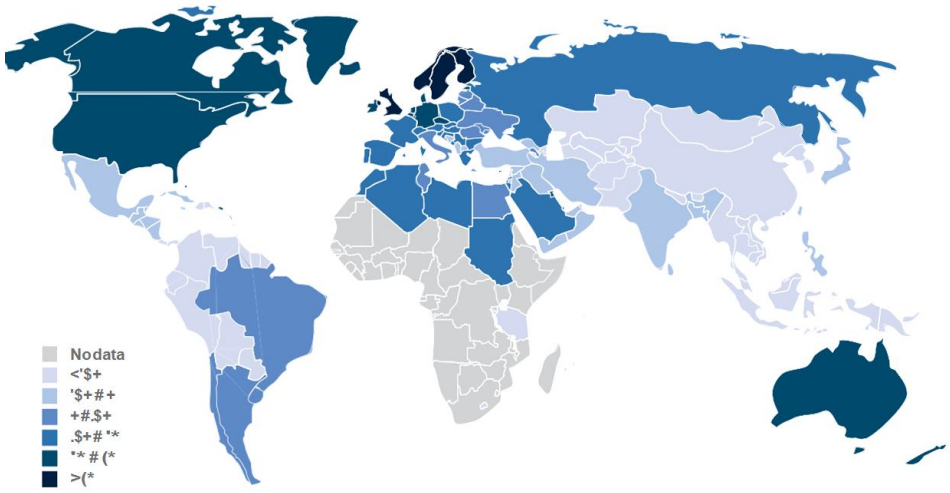

Fig. (1): Epidemiological map of new cases of type 1 diabetes in children, 0-14 years (cases per 100,000 aged 0-14 years per year), 2010.

T1DM is one of the most common endocrine and metabolic conditions in childhood. Data on incidence of childhood onset T1DM are very limited. Data from large epidemiological studies worldwide indicate that on an annual basis, the overall increase in the incidence of T1DM is around 3% and about 78 000 children under age 15 years develop T1DM worldwide ***(International Diabetes Federation, 2013).***

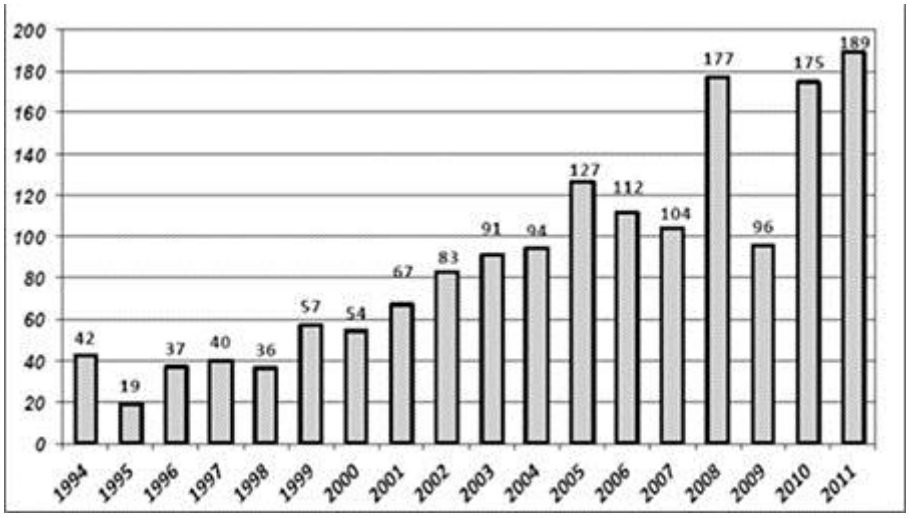

Fig. (2): Annual numbers of new patients with type 1 diabetes mellitus (T1DM) among children aged 0-18 years in the Nile Delta region (1994-2011).

The worldwide geographic variation in the incidence of T1DM is striking. The overall standardized incidence varies from 0.1/100 000 per year in the Zunyi region within China to more than 40/100 000 per year in Finland in children under the age of 15 years ***(EURODIAB ACE Study Group, 2000).***

This almost 400-fold variation in incidence can hardly be explained by genetic factors alone. Environmental factors have

long been implicated in the pathogenesis of T1DM both as initiator and potentiators of pancreatic β-cells destruction ***(Knip and Simell, 2012).***

Among Eastern Mediterranean and Middle Eastern countries, the largest contribution to the total number of estimated childhood T1DM cases comes from Egypt which accounts for about a quarter of the region's total. The incidence varies between 1/100 000 per year (Pakistan) and 8/100 000 per year (Egypt) in children under the age of 15 years ***(Soltèsz et al., 2006).***

The estimated prevalence of type 1diabetes is 0.27/1000 in Fayoum, 0.17/1000 in Menofia, 0.8/1000 in Suez and 0.3/1000 in North Sinai. The overall incidence is 3.5/1000 ***(Salem et al., 2010)***.

In Europe, the Middle East and Australia rates of T1DM are increasing by 2-5% per year ***(Khardori, 2011).***

World Health Organization (WHO) projecting that there are almost 221 million cases in the year 2010 and will be up to 285 million cases in the year 2025. It is the fourth or fifth leading cause of death in most developed countries ***(Al Rashed, 2011).***

Race

Type 1 diabetes mellitus is more common among non Hispanic whites, followed by African Americans and Hispanic

Americans. It is comparatively uncommon among Asians. Scandinivia has the highest prevalence rates for T1DM (i.e. approximately 20% of the total number of people with DM), While China and Japan have the lowest prevalence rates, with less than 1% of all people with diabetes. Some of these differences may relate to definitional issues and the completeness of reporting ***(Hussain and Vincent, 2010).***

Gender

In general, males and females have similar risk of type 1 diabetes ***(Gale and Gillespie, 2001),*** with the pubertal peak of incidence in females preceding that in males by 1-2 years. In lower risk populations, such as Japan, there is a female preponderance with females outnumbering males by 1.4:1 ***(Kawasaki et al., 2006).***

Age

In most western countries, type 1 diabetes account for over 90% of childhood and adolescent diabetes, although less than half of individuals with type 1 diabetes are diagnosed before the age of 15 years ***(Thunander et al., 2008).*** Type 1 diabetes incidence varies greatly between different countries, within countries and between different ethnic populations.

Mean annual incidence rates for childhood type 1 diabetes (0-14 years age group) is (0.1 to 57.6 per 100,000) comparing different countries of the world ***(Craig et al., 2009).***

Etiology and Pathogenesis:

Type 1diabetes is a disorder that arises from autoimmune destruction of insulin producing pancreatic beta cells ***(Bluestone et al., 2010).*** it is considered, to represent a disorder "autoimmune" in nature, meaning patient often express features reflective of an immunological contribution to their disease pathogenesis (e.g. autoantibodies, genes associated with immune related genetic susceptibility, etc.) yet, not all T1DM patients possess these characteristics; leading some to the proposed classification of type 1 A (autoimmune) diabetes for the 70-90% of TIDM patients having these immunological self – reactive properties, with type 1 B (i.e., idiopathic) representing the remainder whose specific pathogenesis remains unclear ***(Atkinson, 2012).***

The natural history of type 1 diabetes suggests stages that commence with a genetic susceptibility, autoimmunity without clinical disease, and finally clinical diabetes ***(Achenbach et al., 2005)***, when islet autoantibodies first appear in life, some of the genetic factors influencing their development, and which characteristics of islet autoantibodies are most associated with progression to type 1diabetes. The relevant islet autoantibodies to insulin (1AAs), the 65-kDa is form of GAD (autoantibody to GAD) and the protein tyrosine phosphates related molecules 1A-2 (autoantibody to 1A-2) ***(Atkinson and Eisenbarth, 2001)***

Genetics

Determine that Type 1 diabetes is a disease that involves many genes; More than 50 genes are associated to type 1diabetes. Depending on locus or combination of loci, they can be dominant, recessive, or somewhere in between. The strongest gene, IDDM1, is located in the MHC Class II region on chromosome 6, at staining region 6p21. Certain variants of this gene increase the risk for decreased histocompatibility characteristic of type 1. Such variants include DRB1 0401, DRB1 0402, DRB1 0405, DQA 0301, DQB1 0302 and DQB1 0201, which are common in North Americans of European ancestry and in Europeans. Some variants also appear to be protective ***(Bluestone et al., 2010).***

Families' aggregation of type 1 diabetes has been recognized for many years, and 10-13% of newly diagnosed children have a first degree relative affected with type 1diabetes. With respect to family history, risk of developing islet autoimmunity varies depending on which relative(s) have type 1 diabetes. The risk also depends on the number of relatives with type 1 diabetes ***(Achenbach et al., 2005)***.

Environmental

Factors can influence expression of type 1. For identical twins, when one twin has type 1 diabetes, the other twin only has it 30%–50% of the time. Thus for 50%-70% of identical

twins where one has the disease, the other will not, despite having exactly the same genome; this suggests environmental factors, in addition to genetic factors, can influence the disease's prevalence.

Other indications of environmental influence include the presence of a 10-fold difference in occurrence among Caucasians living in different areas of Europe, and that people tend to acquire the rate of disease of their particular destination country ***(Knip et al., 2005)***.

Virus

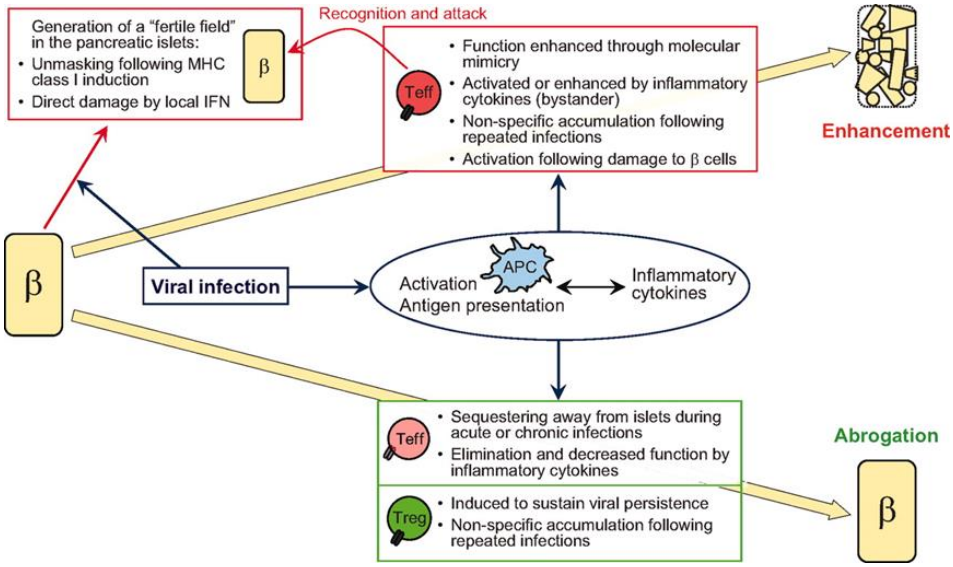

Fig. (3): Interplay between virus- and host-intrinsic properties dictates whether enhancement or abrogation of type 1 diabetes occurs. β = β cells. Teff, effector (autoreactive) T-cells ***(American Diabetes Association, 2008).***