Diabetes Mellitus Type-1 and Psychosocial Intervention to Improve Quality of Life
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ABSTRACT
Type 1 diabetes mellitus is the most common chronic endocrine pathology among children. Data from the Indonesian Pediatric Association (IDAI) states that the incidence of DM in children aged 0-18 years has increased by 700% over a period of 10 years. Treatment includes diet, physical activity, insulin medication, and proper self-control. The necessary changes in habits and lifestyles can lead to psychosocial problems, including anxiety, depression and eating disorders. Subsequently, the child or adolescent and his or her family group may move into new balance characterized by good self-control and adherence to treatment, or deepen individual and group disorders which may reappear, especially in adolescence. The comprehensive treatment of type 1 diabetes mellitus requires addressing these aspects through multidisciplinary teams which include medical and psychosocial professionals. This review analyses the main aspects related to the psychosocial impact of diabetes mellitus type 1 among children, adolescents and their families mental. A substantial amount of behavioral science research has demonstrated that psychosocial factors play an integral role in the management of diabetes in both children and adults. Research has also shown how psychosocial therapies that can improve regimen adherence, glycemic control, psychosocial functioning, and quality of life.

Introduction
Diabetes Mellitus Type 1 (DMT1) or known as Insulin Dependent Diabetes Mellitus (IDDM) is one of the types of diabetes mellitus (DM) with a classification of dependence on insulin to regulate glucose metabolism in the blood.1 Systemic abnormalities of T1DM cause impaired glucose metabolism characterized by chronic hyperglycemia. This situation is caused by damage to pancreatic cells both by autoimmune and idiopathic processes so that insulin production decreases and even stops.2 Low insulin secretion results in disturbances in carbohydrate, fat, and protein metabolism.3

Often DM is considered an adult disease. However, DM can also occur in children and adolescents, especially type-1 diabetes. Although the cases of type-1 diabetes are mostly in children, there is a tendency to increase cases of type-2 diabetes in children with risk factors for obesity, genetics and ethnicity, as well as a family history of type-2 diabetes. Data from the Indonesian Pediatric Association (IDAI) states that the incidence of DM in children aged 0-18 years has increased by 700% over a period of 10 years. The number of new cases of type-1 and type-2 DM differs between populations with varying age and ethnic distributions. From September 2009 to September 2018 there were 1213 cases of type-1 DM, most of which were found in big cities such as DKI Jakarta, West Java, East Java, and South Sumatra. Data
collection on the number of cases of type 2 DM in children has not been widely carried out. The number of patients with type 2 DM at Cipto Mangunkusumo Hospital was recorded as 5 patients from 2014 to 2018.4

**Diabetes mellitus type-1**

Diabetes mellitus type 1 (DMT-1) is one of the chronic diseases that most often affects children, is complex and invasive.5,6 Treatment should include a nutritional diet, regulation of daily physical activity, use of appropriate insulin therapy and glycemic control.7 Inadequate control can affect development, increase comorbidities, decrease life expectancy and increase the risk of acute and chronic complications associated with diabetes.8 Responsibility for the care of children with diabetes implies the impact of a psychosocial dimension, both on children and on their families.9 This disease, being chronic, affects different stages of the life of the people who suffer from it. Adolescence is considered to be one of the most complicated stages, due to all the changes that are experienced, both physiological and psychosocial, with young people with diabetes being susceptible to higher levels of stress and psychological illness.10,11 In view of the above, it is necessary for psychological monitoring, especially at this stage, to adopt a more biopsychosocial and environmental approach. In this way, better results will be achieved in disease control and quality of life.9

Clinical and epidemiological aspects of DMT-1 It results from the autoimmune destruction of beta cells in the pancreas, leading to complete insulin deficiency, in which the person must administer exogenous insulin on their own. It usually occurs in childhood, although some people are diagnosed as adults. DMT-1 occurs in genetically susceptible individuals, activated by unknown environmental agents. The autoimmune process is believed to occur for months to years before clinical symptoms (polyuria, polydipsia, polyphagia, weight loss) occur and hyperglycemia is diagnosed.1 It is a complex and invasive childhood disease, difficult to control because, for the affected individual, it presents a variety of physical, clinical and psychosocial complications.8 The American Diabetes Association (ADA) and the World Health Organization (WHO) have diagnostic criteria: fasting glycemia with a level of 126 mg/dL at least twice, glycemia at 2 hours after 75 g glucose more than 200 mg/dL, symptoms of diabetes and glycemia more of 200 mg/dL, or glycylated hemoglobin (HbA1c) > 6.5%.5

The incidence of DMT-1 is increasing worldwide 5,12,13, making it the third most common chronic condition in childhood.6 This is why in 2006 the United Nations focused on diabetes and named it one of the major threats to global health.9 It is said that this increase is a reflection of the modern lifestyle.13 Self-management of T1DM is very important to reduce risks and complications in the short and long term. To have good self-control, there must be a balance between diet planning, regulation of daily physical activity, use of appropriate insulin therapy, and optimal glycemic control, but self-control is difficult to achieve.6,8

Currently, the main goal is to maintain good glycemic control and quality of life.11 For this, the patient must self-inject several times a day and receive basal insulin or give subcutaneous insulin continuously throughout the day, using an infusion pump.7 When children start with the disease, most require hospitalization with intravenous therapy to treat diabetic ketoacidosis and dehydration problems. In addition to compensating patients, insulin therapy should be initiated, for this comprehensive education is provided on the practical and theoretical aspects of self-control that they should carry.14

The test of choice to see which treatment a patient has is HbAc1, the goal for a diabetic patient is 58 mmol/mol (7.5%) or less.6 Thanks to new advances in insulin types and their route of administration, the average HbA1c and the percentage of children and adolescents reaching the 7.5% HbA1c goal have slightly increased.15 High HbA1c values are associated with cardiovascular problems, neuropathy, nephropathy, retinopathy, periodontal problems, erectile dysfunction, among others.5,6 Adherence to glucose control, insulin administration and careful evaluation of diet is very important, which is why these patients are regularly evaluated by doctors, nurses and
Unlike other pathologies, where decisions about treatment are made exclusively by medical specialists, much of the responsibility for daily self-care of DMT-1 rests with young people and their families, even soon after diagnosis. These patients have low family well-being, high impact on social life, and family conflicts; elements that are often not evaluated by professionals. A German study showed that, despite recommendations for providing appropriate mental health assessment and treatment, only 28% of young people with increasing symptoms of depression reported receiving psychological treatment. Positive health outcomes come from effective communication between professionals and parents, but this communication in practice is not ideal. When the communication skills of professionals are poor, they can cause parents to stop attending examinations. It is important that healthcare teams are trained to attend to the emotional needs of children, youth and caregivers, increasing their adherence to treatment.

**Psychosocial impact of DM type-1**

The diagnosis of DMT-1 has a profound impact, even causing significant trauma. This leads to a state of shock with feelings of pain, anger and isolation due to the complex, violent and invasive nature of the disease and confrontation with the reconstruction of a new normal of life. In addition to changes in family habits and lifestyle, uncertainty about your child’s future, myths and thoughts about acute and chronic complications, pose a variety of psychosocial problems for the child or adolescent being diagnosed, and their immediate environment. The level of support offered to parents at the time of diagnosis is critical to their long-term coping skills. If adequate psychosocial support is available, knowledge and self-confidence can be built, leading to greater adherence to medication, better glycemic control, a better general perception of quality of life and a reduction in complications.

During the pediatric period, parents assume responsibility for blood glucose monitoring, insulin administration, and meal planning, being the patient as well. This places very important demands on family members, facing different challenges at each stage of growth and development. These parental responsibilities can cause stress, producing symptoms of burnout, especially in mothers. Parents bear the burden of raising a child with diabetes, often experiencing guilt and worries about hypoglycemia and future complications. Some families can handle the new responsibilities of having a member with DMT-1 well. However, for other families it becomes a heavy burden if they also face other problems such as poverty, unemployment, lack of time or have other members with chronic diseases. Impact on family life is recognized as a factor influencing treatment of DMT-1, either by interfering with parents’ ability to monitor or creating a hostile environment. Even families with very young children can become socially isolated because of fear, especially hypoglycemia. For this reason, appropriate psychosocial support for families and communities in which children develop is very important. It often affects not only the parents or guardians of a child with T1DM, but there are behavioral problems, low self-esteem and emotional disturbances in the siblings, although some can increase their maturity and gain strength with the situation. As children get older, the responsibility for this good control is partly shared by their peers and teachers in their schools, who play an important role. This transfer of responsibility can cause such a level of anxiety that parents can cause symptoms of burnout. Research shows that type 1 diabetes is a risk factor for the development of psychiatric disorders in children and adolescents. Many children experience adjustment problems soon after a diabetes diagnosis. Although most children resolve these problems within the first year, children who do not are at risk of poor adaptation to diabetes, including problems with regimen adherence, poor metabolic control, and advanced psychosocial difficulties. In addition, many mothers of newly diagnosed children are at risk for adjustment problems, with significant depressive symptoms observed in about one third of mothers; mostly subside within the first year after their child’s diagnosis. Research has also shown that diabetic adolescents, especially adolescent girls, have an
increased risk of eating disorders. Both eating disorders and subclinically disorganized eating attitudes and behaviors have been observed in adolescent girls with diabetes and are associated with poorer metabolic control. At least 10% of adolescent girls with type 1 diabetes meet the diagnostic criteria for an eating disorder, a rate twice as high in girls without diabetes. Without intervention, eating disorders and insulin manipulation can worsen over time and increase the risk of health complications.

Neurocognitive function

Studies show that children who have diabetes before the age of 5 years and/or who have frequent episodes of hypoglycemia are at risk for neurocognitive deficits, especially in visual-spatial function. In addition, research findings suggest that children with diabetes miss school more than their non-diabetic peers and that lower reading achievement is associated with more absenteeism from school. Research also shows that children with diabetes, especially boys, are more likely to have learning problems. Other studies have found poorer attention function and lower verbal intelligence in children with a history of significant hypoglycemia. A longitudinal study of newly diagnosed children revealed decreased verbal intelligence and school grades, partly predicted by memory dysfunction. Another study showed that 2 years after diagnosis, children showed mild neuropsychological deficits, including decreased speed of information processing, and decreased conceptual reasoning and acquisition of new knowledge, which was predicted by recurrent hypoglycemia and hyperglycemia, as well as early onset diabetes (before age 5 years). Quality of life. Relatively few studies have specifically examined quality of life in children and adolescents with diabetes. Quality of life in individuals with diabetes can be reliably measured by self-report. Research findings suggest that a better quality of life in young people is associated with increased self-efficacy and reduced depression, as well as improved metabolic control. Psychosocial factors associated with regimen adherence and metabolic control. Studies have shown that regimen adherence declines over time and is particularly poor among some adolescents. Metabolic control has been noted to be worse in single-parent, low-income, African-American youth. Family factors are significantly associated with regimen adherence and metabolic control in children and adolescents. For example, low levels of family conflict and stress, high levels of cohesion and organization, good communication skills, and appropriate involvement of both parents and children in diabetes management have been associated with higher rates of regimen adherence and better metabolism control. When parents allow adolescents to have self-care autonomy without adequate cognitive and social maturity, they tend to have more problems with diabetes management. Research has also examined the role of stress and coping in relation to diabetes management. Children who have less life stress and who cope well with diabetes management are more likely to have fewer problems with regimen adherence and metabolic control. Adolescent health beliefs are related to regimen adherence and their glycemic control. In particular, high levels of self-efficacy and levels of learned helplessness have been associated with good glycemic control. Certain health beliefs related to the seriousness of diabetes, personal susceptibility to complications, costs of regimen adherence, and beliefs in treatment efficacy have also been associated with regimen adherence and glycemic control. Similarly, studies with young children have shown that their health beliefs are related to adherence and glycemic control.

Psychosocial therapy

A number of controlled studies have examined the efficacy of psychosocial interventions for diabetic adolescents. Most have included the family as an integral part of treatment. Research findings suggest that family-based behavioral procedures such as goal setting, self-monitoring, positive reinforcement, behavioral contracts, supportive parental communication, and appropriate shared responsibility for diabetes management have improved regimen adherence and glycemic control. In addition, these interventions can improve parent-adolescent relationships. Psychoeducational interventions with
children and their families that promote problem-solving skills and increase parental support early in the disease course have improved children's long-term glycemic control. The efficacy of group interventions for diabetic adolescents has also been systematically evaluated. For example, research findings suggest that peer group support and problem solving have improved short-term glycemic control. Group coping skills training has been shown to help optimize glycemic control and quality of life of adolescents involved in intensive insulin regimens. In addition, stress management and training in coping skills have reduced diabetes-related stress and increased social interaction in adolescents.

Discussion

The literature reports a large number of psychosocial factors associated with T1DM, especially in adolescents. Various studies link this disease with psychosocial problems that interfere with glycemic control and family and social relationships. It is relevant to carry out interventions that address these aspects, including a team of mental health professionals. Adolescents with chronic diseases have higher risk behaviors, this is how adolescents with DMT-1 present adverse psychosocial factors that drive high-risk behaviors7,30. This is even more significant given the low number of adolescents with depressive symptoms receiving psychological treatment12. Education has not yet had a major impact on glycemic control, which is why interdisciplinary interventions are needed including the medical and psychosocial aspects of people and their families, improving coping and problem-solving skills. It is important that interdisciplinary teams working with patients with T1DM and their families maintain regular contact, emphasizing family participation in diabetes management. Previous studies have suggested that family factors have a greater impact than insulin treatment, and peer support will also have an impact on diabetes self-care. Another relevant factor is gender, indicating the level of physical activity undertaken by girls is much lower than boys, so it will be a risk factor for them. Likewise, during puberty, with hormonal changes, women have poorer diabetes management, thereby increasing complications. In addition, women score lower in quality of life evaluations, a problem for which there is no clear explanation, but which could be due to the fact that adolescents have more psychosocial and emotional problem. However, adolescents with T1DM must be responsible for the management of their disease, but always with the support of their families, to have a good transition to adult care. Examples are the TEENCOPE intervention (coping skills training program) and Managing Diabetes (diabetes education program) 20. Both interventions obtained good results in terms of an increase in Quality of Life scores and a slight increase in HbA1c48 levels. Also of note is the CASCADE study (Structured Competency Approaches of Children and Adolescents to Diabetes Education), a structured, clinic-based group education program that combines psychological approaches to improve long-term glycemic control, quality of life and psychosocial functioning in diabetic children and adolescents. The results of this study indicate that there is an improvement in family relationships, better knowledge and understanding, greater self-confidence and greater motivation to control their diabetes. The foregoing reveals the need to find other ways to improve control of DMT-18, one of which could include professionals in mental and behavioral health for children and adolescents in interdisciplinary teams, such as psychologists, social workers and psychiatrists, producing interventions and programs with psychosocial approach in our country.

Conclusion

A large number of behavioral science studies have demonstrated that psychosocial factors play an integral role in the management of diabetes in both children and adults. Studies have demonstrated the efficacy of a number of psychosocial therapies that can improve regimen adherence, glycemic control, psychosocial functioning, and quality of life. Further research in this area is needed to develop psychosocial intervention programs for specific patient populations and to demonstrate the cost-effectiveness of this approach.
References