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Behavioral changes in diabetic children and adolescents: an integrative review

Abstract

Objective: To analyze whether there is strong scientific evidence on the relationship between diabetes mellitus and the behavior of children and adolescents.

Method: Integrative literature review considering the virtual portals PubMed and BVS - Virtual Health Library. In this review were adopted the descriptors or MeSH Terms "Diabetes Mellitus", "Complications of Diabetes Mellitus", "Child Behavior" and "Adolescent Behavior", with the Boolean operators AND an NOT, respecting the PRISMA methodology: Preferred Reporting Items for Systematic Reviews and Meta-Analyses. The guiding question was directly related to the general objective of this review. We included scientific articles, published without time limit, in English, Spanish, and Portuguese. The exclusion criteria were: opinions, letters to the reader, essays, monographs, dissertations or theses, and studies without abstracts, focused exclusively on eating behavior, involving other dysfunctions that may affect the nervous system or behavior, or that were not related to the guiding question. The selection of the records was made independently by two researchers. From the reading of the title and abstract there was the selection of the papers for reading in full.

Results: From 5,355 records, five articles were included and synthesized.

Conclusion: Sleep difficulties, difficulties in the performance of executive functions, cognitive or daily routine were related to behavioral problems of this target population, as well as greater symptoms of depression, anxiety, and emotional instability, with the need for specialized monitoring.

Keywords: diabetes mellitus, complications of diabettes mellitus, child behavior, adolescent behavior

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Introduction

Considering the many challenges for the health of the world population, the significant increase in diabetes among children and adolescents and the associated factors have deserved an emphasis among researchers, due to the various correlated negative impacts in stages that are so important for the physical, intellectual, affective, and social growth and development of human beings. Studies highlight the importance of preventing obesity in children and adolescents. However, Diabetes Mellitus (DM) is a multifactorial metabolic syndrome and it is important to evaluate the emotional component and the mental health of affected individuals, especially in the early stages, in order to minimize negative impacts on the quality of life of this most vulnerable group.[1,2] Demographic and anthropometric characteristics differ between children and adolescents with type 1 diabetes (with absence of insulin secretion) and type 2 diabetes (peripheral insulin resistance causing hyperglycemia) according to the Pediatric Diabetes Consortium Registries. Although a large percentage of older children and adolescents with type 1 and type 2 diabetes are able to achieve target HbA1c (blood glucose levels for the last two to three months), children and adolescents with type 2 diabetes are more likely to maintain glycaemic control than those with type 1 diabetes in the years after diagnosis, despite greater socio-economic obstacles and risk factors.[3,4]

Research in recent years has suggested that viral infections can trigger Diabetes or Diabetic Ketoacidosis (DKA); particularly in the various epidemiological phases of COVID-19, a disease caused by the SARS-CoV-2 coronavirus.[5,6] The purpose of this integrative review is to examine whether there is strong scientific evidence on the relationship between diabetes mellitus and behavior in children and adolescents.

Material and methods

Integrative literature review based on the PRISMA steps, from the guiding question: -There is robust scientific evidence on the impact of diabetes mellitus on the behavior of children and adolescents with this diagnosis?

The virtual research portals PubMed and VHL/BVS were considered to survey the records, considering their main databases, such as: MEDLINE, LILACS (Latin American and Caribbean Literature on Health Sciences) and IBECS (Índice Bibliográfico Español en Ciencias de la Salud).

The following descriptors or MeSH Terms (Medical Subject Headings) were used: "Diabetes Mellitus", "Complications of Diabetes Mellitus", "Child Behavior" and "Adolescent Behavior", with the Boolean operators AND and NOT.

Inclusion criteria: scientific articles, published without time limit, in English, Spanish, and Portuguese.

Exclusion criteria: opinions, letters to the reader, essays, monographs, dissertations, or theses, as well as studies without an abstract, focused exclusively on eating behavior, involving other dysfunctions that may affect the nervous system or behavior, repeated records (only one computed), and those not related to the guiding question.

The selection of the records was made independently by two researchers, with a third independent researcher to give an opinion in cases of disagreement in the selection of the article for full reading or inclusion in this review. After reading the title and the abstract, the articles were selected for reading in their entirety. The search process, data collection, and data organization took place between October and December 2022. The most relevant information was synthesized and presented (Table 1), along with the Discussion.

Table 1 Records included from the review, according to authorship, general objective, sample, and main results or conclusions

Author / Year / Country	Objective	Sample	Results/Conclusiion
Almeida MC et al.,[8]	To study the prevalence of psychiatric disorders in adolescents with and without type 1 diabetes, the factors associated with its presence, and to test the reliability of a screening tool for use in clinical settings.	81 adolescents (36 diabetic participants and 45 controls).	Psychiatric morbidity was high in this sample of adolescents, especially among those with diabetes; such as:depression, anxiety disorders, eating disorder, atention déficit hyperactive disorder, oppositional defiant disorder and conduct disorder (forms of externalizing or internalizing behavior)
McDounough RJ et al.,[9]	To evaluate the impact of sleep on adherence in teens with T1D (type 1 diabetes mellitus)	45 adolescents aged 12-18 yr, with T1D for at least 6 months while on insulin pump therapy.	Analyses suggest an associated increase in T1D self-management behaviors in youths with increased sleep duration. Specifically, a 15- and 20-min increase in sleep was associated with one additional SMBG (Self-Monitored Blood Glucose) check and one additional insulin bolus, respectively.
Brady CC et al.,[10]	To understand the cognitive and behavioral performance in obese adolescents with type 2 diabetes.	40 adolescents (20 obese with type 2 diabetes and 20 healthy adolescents)	Adolescents with type 2 diabetes scored below the population mean in academic achievement, most notably calculation. Working memory and processing speed were negatively correlated with duration of diabetes
Pop-Jordanova N et al.,[11]	To evaluate the psychological characteristics of children and adolescents with T1DM treated last year in the University Hospital and to propose some response measures	75 children (25 with diabetes mellitus, 25 with other chronic ill and 25 with a group of healthy children)	Psychological characteristics: mild depression and anxiety, emotional instability, need for social acceptance, as well as the possible psychopathic traits. Suffering for a complex metabolic and chronic illness, these patients need psychological evaluation and intervention in the management.
Leonard BJ et al.,[12]	To determine the relationship between Youth Self Report (YSR) scores for behavior problems, YSR scores forsocial competence, and metabolic control in children and adolescents with Type 1 diabetes	234 youth with Type 1 diabetes and their parents	The children and adolescents with Type 1 diabetes in this study described themselves as quite healthy both socially competent as well as relatively free of behavioral problems. Individuals who reported having higher levels of attention problems, as well as higher levels of aggressive and delinquent behavior higher levels of aggressive and delinquent behavior diabetes in this study described themselves as quite healthy both socially competent as well as relatively free of behavioral problems. Individuals who reported reported higher levels of GHb (Gamma-Hydroxybutyric acid).

Source: Survey data, 2022

Results and discussion

For a total of 5,355 records obtained (4,844 in PubMed and 511 in the VHL/BVS) and according to the inclusion and exclusion criteria adopted, 123 studies were selected, and 39 articles were eligible for full-text reading. As a final sample, five articles were included for data synthesis and evaluation, as shown in the following chart Table 1.

Despite the number of diabetes-related records collected at the beginning of this review, most of them were directed to compulsive eating behavior in obese children and adolescents. Understanding behavioral characteristics is not simple; it covers scales with different methodologies. However, the behaviors of children and adolescents can generally be analyzed within the family and their school or social environment, which has undergone major changes with the pandemic of COVID-19.

Research conducted over several decades supports the conclusion that early peer relations are one of the best predictors of later socialpsychological adjustment. Principal risk factors include two forms of externalizing behavior (i.e., aggressive, hyperactive–distractible), two forms of internalizing behavior (i.e., asocial, anxious–fearful), and one feature of children's peer relations (i.e., peer group rejection). Aggression with agemates is a powerful predictor of maladaptation not only during childhood (e.g., peer rejection, school disengagement, underachievement); but also during adolescence and adulthood.[13,14,15]

The above-mentioned variables were most addressed in the studies of Almeida et al.[8] And de Pop-Jordanova et al.[11] The work of Almeida et al. [8], the case-control type; it would have greater strength, in terms of scientific evidence.[16] High-quality scientific evidence requires approaches to evaluate the research methodologies. But the methodologies adopted are often not clearly presented.

According to the contextualization to the main results of the five studies included in this integrative review, psychiatric morbidity was high between adolescentes with DM is the first one [8] described in Table 1. To Nguyen et al.[17] parental depressive and anxiety symptoms did not predict adolescent health outcomes in adolescentes with type 1 diabetes. Future studies may determine whether the link is present in case of mood/anxiety disorders or severe diabetes-specific distress, or whether adolescents are resilient in the face of parental distress.

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Henriquez-Tejo et al.,[18] in a review of the literature on the impact of type 1 diabetes on children, adolescents, and their families, highlighted that the self-control may be difficult, resulting in children, adolescents and their families suffering diverse psychosocial complications. There is an inverse relationship between self-control and psychosocial complications, the main problems being anxiety and depression, where adolescents are 2.3 times more likely to have mental health problems. These authors reinforced that comprehensive treatment of type 1 diabetes mellitus requires addressing these aspects through multidisciplinary teams which include medical and phychosocial professionals.

Results highlighted in the second study[8] demonstrated the positive influence of longer sleep duration on the behavioral characteristics of adolescents with type 1 diabetes, recording a positive association between longer sleep duration and greater self-control in this group. In a systematic review on the topic, Ji et al.,[19] suggested shorter sleep duration and worse sleep quality in individuals with T1DM. Higher A1C (glycated hemoglobin) levels and undesirable T1DM self-care behaviors were associated with short and long sleep duration, poor sleep quality, sleep disturbances, and irregular sleep, particularly among adolescent boys, young men and those from immigrant families. Self-care behaviors mediated the associations between sleep and subsequent A1C levels.

The cognitive performance and behavioral skills of obese adolescents with type 2 diabetes were surveyed in the third paper10 described in Table 1, highlighting negative repercussions in both variables considered. Compared to the study of Pinhas-Hamiel et al.,[20] Cognitive Behavioral Therapy (CBT), acceptance and commitment therapy, and mindfulness interventions have demonstrated improvement in depression, anxiety, and glycemic control. We assessed whether these treatment modalities have shown usefulness in adolescents girls with T2D or at risk for T2D. These authors recommended that studies should involve males at risk for T2D, and adolescents diagnosed with T2D. Longer interventions and booster meetings for maintenance should be studied.

In the last two papers described in Table 1,[11,12] characteristics of instability in mental health, with pictures of depression and possible problems in the performance of cognitive activities were mentioned, particularly for children and adolescents with type 1 diabetes. They reinforce that the suffering associated with this complex and chronic metabolic disease needs to be taken into consideration and accompanied, treated, with a reinforcement of resilience and the meaning of life, of plans for the present and future with the best possible quality. When the level of attention and very aggressive behaviors are noted, some factors should be investigated more closely and monitored, such as the levels of GHb.

By reviewing the included research, the complexity of factors involved in DM, particularly among children and adolescents, is reinforced. Sleep disturbances, difficulty in attention, and cognitive impairments observed, lead to possible changes in behavior, at stages that have a direct impact on development and on the adult they will become. Thus, the suggestion for more comprehensive studies directed at providing adequate support to this target population is raised.

Conclusion

There is scientific evidence on the condition of DM in childhood and adolescence, with impacts on the behaviors of these individuals. However, there are gaps regarding the control and adherence to the measures adopted to enable a better quality of life, considering the inseparability between physical and mental health.

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Conflicts of interest

The author declares there is no conflict of interest.

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