

Specific Learning Disorders (SLD) in Children with Type 1 Diabetes Mellitus (T1DM): Priorities in an Interdisciplinary Approach: From Theory to Implementation

Emily Ashford*

Editorial Board, Primary Health Care: Open Access, UK

Corresponding Author*

Emily Ashford

Editorial Board, Primary Health Care: Open Access, UK

Email: primcare@scholarcentral.org

Copyright: ©2022 Ashford, E. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Received date: 01-June-2022, Manuscript No: JPHC-22-79277; **Editor assigned:** 03-June-2022, PreQC No. JPHC-22-79277(PQ); **Reviewed:** 13-June-2022, QC No. JPHC-22-79277(Q); **Revised date:** 15-June-2022, Manuscript No: JPHC-22-79277(R); **Published date:** 20-June-2022, DOI: 10.35248/2376-0389.22.12.06.449

Abstract

Background: A significant effort had been expended not only to comprehend the associated challenges for children and adolescents with Specific Learning Disorder (SLD) and Type 1 Diabetes Mellitus (T1DM) but also to describe the necessary skills and approaches that caregivers must develop to assist both children and parents.

Aim: This review has two objectives. To begin, the potential impact of T1DM on psychological well-being, cognitive functioning, and school performance in children and adolescents with SLD is highlighted. Second, we will discuss the importance of a multidisciplinary approach to poor school performance in students with SLD and T1DM, highlighting the significant contributions of care providers such as parents/caregivers in the family setting, teachers and psychologists in the school setting, and health specialists (pediatricians, nutritionists, nurses, child psychiatrists, and psychologists) in the medical setting.

Conclusions: T1DM diagnosis and treatment are a significant burden for children and their families; however, T1DM may or may not be associated with a variety of academic and psychological outcomes. Despite the variability in the quality of the reviewed research designs, the impact of T1DM was clearly defined across educational and mental variables. Improving children's physical, psychological, and social well-being is especially important because it helps with insulin management as well as learning difficulties. This is possible by encouraging parental and teacher participation in the intervention process. This review emphasizes the need to bridge the gap between theory/research and practice in some of the proposed areas of knowledge.

Keywords: Specific learning disorders • Type I Diabetes Mellitus (T1DM) • Narrative review • Interdisciplinary approach • Children and adolescents

Introduction

The presence of chronic diseases, such as Type 1 Diabetes Mellitus (T1DM), hurts academic performance, particularly in children with Specific Learning Disorders (SLD) (previously called juvenile diabetes or insulin-dependent diabetes). Being diagnosed with a chronic illness can be overwhelming, especially at first, for the child and his or her family. We recognize that living with T1DM can be extremely difficult for children, adolescents, and their families due to the complexity of treatment, the involvement of adult caregivers, and the required support from the school setting. Children with T1DM and

SLD face significant challenges in managing insulin as well as learning difficulties in the classroom.

Data from the studies examined in this study shows that students with learning disabilities have higher rates of diabetes than the general population. The 2016 Public Health England NHS Digital report supports the occurrence of higher rates of both diabetes types in all age groups in the SLD population compared to the general population, and with an earlier onset, recorded at a younger age. Furthermore, the increased risk of autoimmune manifestations, including T1DM, observed in Down's syndrome could explain the prevalence of T1DM in children and adolescents with SLD. Furthermore, SLD is linked to a higher risk of developing Type 2 Diabetes Mellitus (T2DM) later in life [1], a higher risk of obesity due to a low-exercise and high-fat diet, and higher levels of prescribed antipsychotic medication. To begin with, because there are few facts about the coexistence/comorbidity of SLD and T1DM in the literature, it is important to clarify some points about prevalence and phenomenology that distinguish them.

Specific learning disorder

Specific Learning Disorder (SLD), also known as learning disorder/disability, is a neurodevelopmental and neurobiological disorder that typically begins in early childhood but may not be recognized until adolescence or even adulthood. According to the DSM-5 diagnostic criteria, SLD is characterized by three types of continuous difficulties in learning ability, involving one of three fundamental domains of reading, writing, or math, manifesting as a failure in the development of these skills following the age grade. Other disorders such as memory problems, inattention, and social interaction difficulties may also contribute significantly to poor school performance, necessitating a more targeted intervention [2]. Beyond lower academic achievement, ongoing difficulties may have a negative long-term impact on adult life if not identified and managed at a young age. Low academic achievement and dropping out of school during adolescence are linked to later-life mental distress, unemployment, or underemployment. Numerous studies have found that the prevalence of SLD varies according to age, gender, psychosocial stage of development, and environmental factors. Comorbidity of SLD with other disorders is typically associated with more complicated manifestations and severe emotional and behavioral symptoms, necessitating interdisciplinary intervention [3]. SLD is a multifactorial disorder caused by genetic or environmental factors that affect brain structure and function [4]. Many studies have identified genetic and family load, developmental factors, cognitive skills, native language, academic degree, and environmental factors, such as socioeconomic status, as severe etiological factors. Table 1 defines various risk factors as SLD predetermines, indicating that the prevalence of SLD is higher in children with the aforementioned family history, medical history, and socioeconomic status. A plethora of research studies has found that the prevalence of SLD varies significantly across countries and by gender, with boys having higher rates than girls [5].

These conditions are assessed through a series of essential examinations, laboratory diagnostic tests, and supplemental appraisals, as well as more specialized testing and/or referral, such as blood lead levels, audiological and vision screening tests, and so on. Qualitative observations and/or the student's report card can frequently identify SLD, but psychometric testing (Wechsler Intelligence Scale for Children (WISC) is required to make a formal diagnosis. SLD is frequently present in conjunction with the conditions listed above [6]. The most common comorbidities with SLD are anxiety disorders, behavioral

disorders, depressive disorders, motor delays/disorders, neurodevelopmental disabilities (such as Attention Deficit Hyperactivity Disorder-ADHD), speech-language delays/disorders, social-emotional problems, and substance abuse. In terms of terminology, the terms "SLD," "Specific Learning Disability," "learning disability," and "learning difficulties" refer to a diverse group of disorders/difficulties revealed through unsuccessful attempts to obtain knowledge, which could then be retrieved and utilized efficiently [7]. The terms "SLD," a medical term, "learning disorder", and "learning disability," an academic and legal term, are not synonymous. "Learning difference" is a widely accepted term that helps children and adolescents reveal and communicate to others the difficulties they face in learning and school performance without labeling them as "disordered" or "disabled," in the sense that the term "learning disability" reveals an intellectual disability, formerly referred to as "mental retardation".

Type 1 Diabetes mellitus

In children, Type 1 Diabetes Mellitus (T1DM) is also referred to as "insulin-dependent" or "juvenile." Diabetes, which is typically diagnosed in childhood and adolescence, can appear at any age and is a chronic disease. It accounts for about 5% of all diabetes patients, and its incidence and prevalence are increasing globally [8]. Childhood and adolescence are marked by rapid developmental transitions and major changes in the brain, making them more vulnerable to glycemic extremes. T1DM with early onset in childhood may hurt the development of the Central Nervous System (CNS), as evidenced by a decrease in cognitive and psychomotor efficiency, mental flexibility, and attention as a result of secondary conditions (such as chronic hyperglycemia, microvascular abnormalities, and so on). According to several prospective studies, the decline in cognitive functioning is associated with early onset in childhood and microvascular complications (such as retinopathy, nephropathy, and neuropathy) rather than severe hypoglycemia; higher HbA1c levels are indicative of mental and psychomotor dysfunction. Furthermore, studies in preschoolers with severe hypoglycemic episodes at the younger age of 5 years-7 years old found declines in spatial cognition and information recall, indicating the developing CNS's susceptibility to severe hypoglycemia [9].

Other studies support the notion that both hypoglycemia and microvascular abnormalities are risk factors for cognitive dysfunction. Adults with T1DM had a significant decrease in psychomotor functioning when compared to non-diabetics, with no difference in learning, recall, or problem-solving skills. Despite numerous studies demonstrating a link between T1DM and structural-functional changes in the CNS, there is no etiological link with specific declines in cognitive efficiency. Studies using neuroimaging techniques, such as structural MRI, revealed lower findings in grey and white matter in T1DM patients compared to non-diabetic peers; this was associated with severe hyperglycemia, early onset, and a longer duration of diabetes. Clinical manifestations of reduced white substance in T1DM patients were associated with inattention and lower performance in information processing speed and executive function. Diabetes onset age and duration, as well as microvascular complications in intraparenchymal cerebral arterioles, are linked to structural changes, specifically White Matter Lesions (WML).

Diagnosis in children can be difficult because symptoms vary from child to child, especially in the early stages. Symptoms typically include excessive thirst, dehydration, frequent urination, high levels of glucose in the blood and urine, unusual hunger or loss of appetite, fruity breath, tachypnea, nausea, vomiting, abdominal pain, weakness, fatigue, mood changes and irritability, severe diaper rash, yeast infection in girls, and so on. The American Diabetes Association (ADA) highlighted the essential distinctions between diabetes with early onset in childhood and adult diabetes in the Position Statement "Care of Children and Adolescents With Type 1 Diabetes," published in 2005. In terms of developmental stage, epidemiology, pathophysiology, and care response. Diabetes management in children and adolescents must begin with an understanding of the child's developmental stage and needs, as well as the child's environmental context. Interdisciplinary intervention that is timely is a node point in preventive care for children and their families [10].

Aim

The goal of this article is twofold: it reports a lack of literature data on children who experience Special Learning Difficulties (SLD) and school failure while struggling to adjust to diabetes type 1. To begin, the potential impact of T1DM on psychological well-being, cognitive

functioning, and school performance in children and adolescents has been documented in the reviewed literature. Second, to discuss the importance of a multidisciplinary approach to academic failure and learning difficulties in children with SLD who have T1DM, highlighting the contributions of (a) parents/caregivers in the family setting; (b) teachers in the school setting; and (c) health specialists (pediatrician, child psychiatrist, psychologist, and nurse) in the medical setting.

Conclusion

T1DM diagnosis and treatment are a significant burden for children and their families. However, T1DM may or may not be associated with a variety of academic and psychological outcomes. Despite the variability in the quality of the reviewed research designs, it was clear that the impact of T1DM is not uniform across educational and mental variables. Early interdisciplinary intervention is critical for children with SLD and chronic diseases such as T1DM.

According to both experience and research, the most beneficial preventive approach for T1DM patients who have educational problems is a supportive family and a school that follows the recommendations of health professionals. More research is needed in this area, particularly studies on the prevalence of T1DM and SLD; determining whether T1DM is a contributor or merely a correlated factor in educational and psychological outcomes, and focusing on the feasibility of insulin management programs for children and adolescent patients with participation from both the family and the school context. This demographic should be encouraged to take part in future research.

References

1. Maine, A., et al. "Diabetes and people with learning disabilities: issues for policy, practice, and education." *Tizard Learn Disabil Rev* (2020).
2. Tatsiopoulou, P., et al. "Priorities in the Interdisciplinary Approach of Specific Learning Disorders (SLD) in Children with Type 1 Diabetes Mellitus (T1DM). From Theory to Practice." *Brain Sci* 11.1 (2020): 4.
3. Alesi, M., et al. "Self-esteem at school and self-handicapping in childhood: Comparison of groups with learning disabilities." *Psychol Rep* 111.3 (2012): 952-962.
4. Taanila, A., et al. "An epidemiological study on Finnish school-aged children with learning difficulties and behavioural problems." *Int J Circumpolar Health* 70.1 (2011): 59-71.
5. Vlachos, F., et al. "Prevalence and gender ratio of dyslexia in Greek adolescents and its association with parental history and brain injury." *Am J Educ Res* 1.1 (2013): 22-25.
6. Creavin, A.L., et al. "Ophthalmic abnormalities and reading impairment." *Pediatrics* 135.6 (2015): 1057-1065.
7. Fakier, N., and Wild, G.L. "Associations among sleep problems, learning difficulties and substance use in adolescence." *J Adolesc* 34.4 (2011): 717-726.
8. Chiang, J.L., et al. "Type 1 diabetes in children and adolescents: a position statement by the American Diabetes Association." *Diabetes Care* 41.9 (2018): 2026-2044.
9. Mayer-Davis, E.J., et al. "Incidence trends of type 1 and type 2 diabetes among youths, 2002–2012." *N Engl J Med* 376 (2017): 1419-1429.
10. Musen, G., et al. "Effects of type 1 diabetes on gray matter density as measured by voxel-based morphometry." *Diabetes* 55.2 (2006): 326-333.