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Name of Journal: *World Journal of Meta-Analysis*

Manuscript NO: 78432

Manuscript Type: SYSTEMATIC REVIEWS

Disordered eating behaviour and eating disorder among adolescents with type 1 diabetes: Integrative review

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Abstract

BACKGROUND

Type 1 diabetes in adolescents brings behavioral changes, altered nutritional habits, and eating disorders.

AIM

To identify and analyze the validated instruments that examine the disordered eating behavior and eating disorders among adolescents with Type 1 Diabetes.

METHODS

Integrative review, accomplished in the following databases: PubMed, LILACS, CINAHL, SCOPUS e WEB OF SCIENCE, including publications in Portuguese, English, or Spanish, without time limit and published.

RESULTS

The main instruments to evaluate disordered eating behavior were: The Diabetes Eating Problem Survey-Revised; The Diabetes Eating Problem Survey; The eating attitudes test-26; and for eating disorders were: The Bulimic Investigation Test of Edinburgh; The

Binge Eating Scale; The Child Eating Disorder Examination; The five questions of the (Sick, Control, One, Fat and Food); The Mind Youth Questionnaire. These instruments showed an effect in evaluating risks regarding nutritional habits or feeding grievances, with outcomes related to weight control, inadequate use of insulin, and glycemia unmanageability. We did not identify publication bias.

CONCLUSION

Around the world, the most used scale to study the risk of disordered eating behavior or eating disorder is the DEPS-R. International researchers use this scale to identify high scores in adolescents with type 1 diabetes and a relationship with poorer glycemic control and psychological problems related to body image.

INTRODUCTION

Type 1 diabetes (DT1) in adolescents brings behavioral changes, highlighting altered nutritional habits and eating disorders. It is worth emphasizing that the greatest challenge of diabetes treatment is glycaemic control through insulin therapy, good nutritional habits, and regular physical activity ^[1], in addition to other health behaviors. However, studies about behaviors with DT1 showed a higher risk of developing eating disorders and dissatisfaction with their body image than their pairs without diabetes. ^[2-3]

The disordered eating behavior (DEB) is related to actibehaving on a diet or to feast, compulsive eating, or purging (inefficient use of laxatives, diuretics, and self-induced vomit) and its frequency has become considerably higher in the last years at different parts of the world. ^[4-5]

³ The prevalence of DEBs among adolescents is estimated at 10% in western cultures. ^[6] In Israel, the estimates are 8.2% among female adolescents and 2.8% for male adolescents. ⁷ DEB and eating disorders were already associated with diabetes mellitus (DM). ^[8-9]

³ Eating disorders (ED) encompass a group of psychiatric conditions that may lead to a persistent failure in attending to nutritional and metabolic needs, thus resulting in severe psychosocial impairment.^[10] EDs are most prevalent among individuals with DM1 than in the average population.^[11]

EDs are eating disorder habits with central psychopathology related to eating, food concerns, and body image. There are for main types of eating disorders: anorexia nervosa (AN), bulimia nervosa (BN), periodic compulsive eating disorder (PCED), and specified eating or eating disorders (BED).^[12]

The knowledge of validated instruments that examined disordered eating behavior and eating disorders of adolescents with type 1 Diabetes may subsidize prevention actions for potential risks to altered eating habits and the handling of grievances related to these disorders, thus supporting the decision in nursing clinical practice and other professionals that give care to adolescents with DT1. Therefore, the research's purpose was to identify and analyze validated instruments that examined disordered eating behaviour and eating disorders among adolescents with type 1 Diabetes.

MATERIALS AND METHODS

It is an integrative review of the literature conducted from February to April 2021 on a single desktop machine. The PICO strategy, which represents the acronym Patient, Intervention, Comparison, and Outcomes, was used to construct the research's guiding question. The categories of this strategy are respectively fulfilled by: "adolescents with type 1 diabetes mellitus"; "validation studies"; "does not apply" and; "eating disorders" and "disordered eating behavior". Therefore, the following question was made: What validated instruments examined the disordered eating behavior or eating disorders of adolescents with type p1 diabetes?

The article selection was based on titles and abstracts of the quoted articles, with the selection of the studies' inclusion and exclusion conditions, without establishing a temporal cut for the inclusion of studies. The inclusion conditions were as follows: fully available articles in the electronic networks; national and international periodicals;

studies regarding validated tools about disordered behavior or eating disorder of adolescents with type 1 diabetes; written in Portuguese, Spanish, or English. In contrast, the exclusion conditions were: incomplete or incompatible texts about the subject, case reports, book chapters, monographs, review studies, editorials, stories in newspapers, or any non-scientific text.

The search for articles was done in the following databases: PubMed/Medline, LILACS, Cinahl, Scopus, and Web of Science. The Periodical Portal, CAFE, from the Coordination for improving Higher Education Personnel (CAPES), was used to access these five databases. The following Health Science Descriptors (DeCS) and (MeSH) were used "*adolescente*", "*diabetes mellitus tipo 1*" and "*Transtornos da Alimentação e da Ingestão de Alimentos*", and their respective English versions, "*adolescent*", "*type 1 diabetes mellitus*" and "*Disorders from eating and food intake*". The crossings were made using the Boolean operator "AND" to combine the descriptors: "*adolescent*" AND "*diabetes mellitus type 1*" AND "*feeding and eating disorders*".

The descriptors were delimited for each selected database (Medical Subject Headings - MeSH, Health Science Descriptors - DeCS, and CINAHL Headings - MH). There was no publication year threshold. The study followed the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) recommendations.^[13]

The evidence level classification regarding the guiding question concerning studies of Intervention/Treatment or Diagnosis/Diagnostic test^[14] was added and presented the following seven levels (I) Evidence of a systematic review or a meta-analysis of all relevant randomized controlled studies; (II) Evidence obtained from well-made randomized controlled studies; (III) Evidence obtained from adequately designed controlled studies without randomization; (IV) Evidence of well-designed case-control and cohort studies; (V) Evidence of systematic reviews from descriptive and qualitative studies; (VI) Evidence of unique descriptive or qualitative studies; (VII) Evidence from authorities opinions or reports from a committee of experts.

In Software R 4.0 we evaluated the random effect and proportion meta-analysis in the 'meta' package.

RESULTS

The initial search in the literature that composed the integrative review obtained a result of 728 studies, distributed in 258 articles published in *Pubmed/MedLine*, 06 in *Lilacs*, 100 in *Cinahl*, 207 in *Scopus*, and 157 in *Web of Science*. After the application of the inclusion and exclusion conditions, the final sample was composed of 13 studies in the following databases: LILACS (01); Pubmed/Medline (04); Cinahl (02); Scopus (03), and Web of Science (03).

The stages of search and selection of studies for the review were summarized in Figure 1, which was made from ¹²the Preferred Reporting Items for Systematic Review and Meta-Analyses (Prisma). ^[13]

13 studies from nine different English were found and English countries were found; two were developed in Norway, Italy, Canada and Turkey. The others were published in the following countries: Brazil, USA, Germany, Netherlands, and China, each with one study. There was an intense time variation regarding the publication year, where only one study was published annually and, exceptionally, two studies in a few years. The first study was published in 2010, and the most recent, 2021. 2013 and 2018 had two studies, and in 2017, three. The other years had one study as per Chart 01.

Concerning the evidence level, from the methodological analysis of the studies, nine are descriptive studies with a quantitative approach, and four are experimental studies of the clinical trial type. Among the observational studies, nine are descriptive with a quantitative approach. The selected analytic studies are divided into nine transversal studies and one longitudinal study, a cohort study.

All studies varied in the evidence level between II, III, IV and VI. The studies ^[15-16] were classified with level II as a clinical trial. The studies ^[17-18] were classified with level III as a clinical trial without randomization and quasi-experimental study. The study ^[19] was classified as level IV as a cohort study. The other studies ^[8,20-26] identified

the clinical question associated with the Diagnosis/Diagnostic test, classified as level VI and descriptive studies as per Chart 01.

Due to the asymmetry of the points, we did not identify publication bias (Figure 2). We have observed a proportion of 0.29 with a confidence interval (CI) of 0.18 to 0.44 and a significant p-value representing almost 30% of the analyzed cases (Figure 3).

DISCUSSION

We have concluded that the most used psychometric scale for analyzing eating behavior and risk for eating disorders is the DEPS-R.

The study shows that patients with type 1 diabetes have a higher frequency of eating disorders and nutritional risk behaviors than the standard population. [20] For sure, these disorders contribute to an increased risk of complications from diabetes, such as abnormal lipid profiles, diabetic ketoacidosis, retinopathy, neuropathy, nephropathy, and mortality increase. [11, 27- 28] Therefore, evaluating these clinical conditions for follow-up and damage reduction with the subjects' effective participation is relevant. [29]

The research which evaluated risks of eating disorders using the following tools: The Eating Attitude Test (EAT-26), The Bulimic Investigation Test of Edinburgh (BITE), and the Binge Eating Scale (BES) shows percentages of patients at risk of eating disorders using cut scores: 45% per EAT, 40% per BITE and 14.3% showed a significant clinical behavior in the gravity scale and 16% per BES. [20] These tools evaluated a specific type of disorder, although of great value, are not directed to patients with DT1, but to the standard population.

Researchers affirmed that eating disorders are characterized by significant hassles in the cognition of the body's image and morbid concern with food, weight, and shape. Adolescents, when trying to control their weight, appeal to behaviors that include self-starvation, self-induced vomit, abusive use of laxatives and diuretics, and a tremendous and significant volume of physical exercise. [15]

One considers habits such as the restriction or omission of insulin as an exclusive disorder eating behavior of people with type 1 diabetes. They are usually considered boundary conditions to an eating disorder because its symptoms have yet to reach a threshold of high degree. Such a condition would be classified as an eating disorder as such. [30-31]

The Study involving adolescents with DT1 demonstrated that a higher BMI was significantly associated with a less positive body image among girls with diabetes. This data emphasizes that the higher BMI has associated with low self-esteem and lower levels of social support among adolescents with diabetes, especially girls. Another addition is that worries about body image and several psychosocial factors can be forerunners to developing eating disorder symptoms. [32]

Instruments capable of validating the eating disorder must be projected to combine the participants' cognitive capacity and the adolescents' development stage. Researchers from Norway observed that no evaluation measures for eating disorders were available to the younger population. Therefore, they used an adaption of the EDE 12.0 tool, which is recognized as a gold standard measure of psychopathology about eating disorders among adults. [33] For this, they adapted and evaluated the psychometric properties of the Norwegian version of the "ChEDE" for children and adolescents. [15]

It is worth highlighting that adolescents with DT1 usually have a complicated state of worries around eating and diet but generally are not associated with weight and body shape issues. Its findings confirm that the ChEDE tool could distinguish eating problems in this group and cognitive and behavioral psychopathology in anorexia. [15]

Another study in Norway to evaluate disordered eating behavior adapted and validated the DEPS-R with children and adolescents with DT1. When comparing the DEPS-R with the EAT-12, the DEPS-R seemed to be a better screening tool for DEB among young patients with type 1 diabetes. In addition to the internal consistency, the DEPS-R was strongly correlated with HbA1c, rather than EAT-12, although both

correlations are presented as relatively weak. Overall, male adolescents reported fewer DEBs than female ones. [19]

Concerning the risk of eating disorders, research analyzed it using the mSCOFF tool, an adaptation of the SCOFF, used for people with DT1. The tool mCOFF was adapted and evaluated for the risk of eating disorders among female adolescents with type 1 diabetes. [21] The researchers affirmed that the mSCOFF tool was applied to 43 female adolescents with DT1, compared with the mEDI instrument, where 10 participants (23,2%) were identified as being at high risk of developing an eating disorder. [21]

In Other studies that zed eating disorders in a similar population, the female participants have presented more elevated results compared to male participants. The studies [15,21] showed these results as intrinsically connected to personal dissatisfaction with body image. Such an issue is the one the girls report the most. It is stated that the genesis and the occurrence of eating disorders can diverge between boys and girls, and the prevalence in male adolescents with DT1 is low. [34]

One highlights another tool to analyze the disordered eating behavior (DEB) in children and adolescents with DT1 - A "Diabetes Eating Problem Survey - Revised (DEPS-R)". Researchers from the USA used a DEPS adapted tool developed for adults with DT1. [25] Such specific tools for diabetes are needed due to the inefficient use of insulin and a potential purgative behavior. These issues are seen as exclusive to individuals with diabetes. [35] The DEPS-R can avoid developing eating disorders, such as bulimia and anorexia.

Therefore, the DEPS-R tool was adapted and validated in several countries, and one emphasizes the study [8] which evaluated the prevalence of disordered eating behavior (DEB) in the region of Marche, Italy, through the use of the Italian version of the DEPS-R for the screening adolescents with type 1 diabetes. The findings indicate a significantly higher prevalence (a score of ≥ 20 DEPS-R of 34.4%), among patients with overweight (65.7%). It was also identified that the participants with a score ≥ 20 in the

DEPS-R have presented significantly higher levels of HbA1c, used higher doses of insulin, and spent less time doing physical exercise.

Researchers observed that there was no instrument planned to support health professionals in identifying disordered eating behaviors in the French adult population with diabetes. Due to this, there was a need to adapt and validate the DEPS-R. Therefore, a study was made to validate the DEPS-R tool with adolescents and adults with type 1 and type 2 diabetes. [17]

The study aforementioned adapted and validated the tool to compare it with the following instruments: Eating Disorders Examination Questionnaire (EDE-Q6), [36] and Eating Disorder Inventory 2-Body (EDI-2). [37] However, the study found significant barriers and limitations, one of which was the reduced participation of adolescents. Thus, the adults prevailed. In addition to this, different constructs of body dissatisfaction could be used to provide more empirical support for the tool *The Questionnaire des Attitudes et des Comportements liés à la gestion du Diabète (QACD)*. This study's innovation was the use of a tool for a heterogeneous public, where there were adolescents and adults diagnosed with DT1 and DT2. [17]

The Turkish version of the DEPS-R adapted and validated this tool for children and adolescents with type 1 diabetes. [22] The results have shown that 25% of the participants had a score of DEPS-R ≥ 20 . Of these, most were women, and from the patients with a score ≥ 20 were not adequately using their insulin to fulfill the demand from the meals at times where they ate beyond what is recommended; a few skipped the follow-up dose of insulin after overeating.

In Germany, researchers adapted and validated the DEPS-R for adolescents with DT1. They analyzed that the insulin restriction or its omission reported to the doctor seems not to be insufficient to the identification of eating disorders. The disordered behavior may come accompanied by feelings of shame and guilt, which can be a barrier for adolescents to talk about their eating behaviours. [23]

For the Italian population, the study used the DEPS-R adapted and validated with patients with type 1 and type 2 diabetes, aged between 13 to 55 years old, being

4
treated with insulin. In general, 21.8% of the sample met the conditions for at least one diagnosis of DSM-5 eating disorder, and 12.8% met the conditions for at least one diagnosis of DSM-IV eating disorder. [26] Moreover, in China, the study adapted and validated the DEPS-R with adolescents from 8 to 17 years old with DT1 and 61 adults with DT1. It was registered that the average score of C-DEPS-R was 21.0. The high risk of disordered eating behaviors among adolescents in this study was 39.3%. [18]

Another tool that evaluated the risk of DEB used the Eating Attitudes Test-26 (EAT-26), which had a valid, sensitive and specific measure to detect individuals with high risk for a diagnosable eating disorder. The researchers used the tool EAT-26 and affirmed in their findings eight cases in a group of healthy brothers. Three were diagnosed with DEB, and one case with anorexia nervosa. In the control group, five cases had a pathological score, where three of these cases were diagnosed with DEB. From this control group, no case was diagnosed with an eating disorder. [16]

Norwegian researchers [24] developed and validated the tool "MIND Youth Questionnaire (MY-Q)" for adolescents with type 1 diabetes. The tool adopted the following domains: Family functioning, depression symptoms, and disordered eating. The multidimensional survey consists of seven subscales (social impact, country, control perceptions of diabetes, responsibility, worries, satisfaction with the treatment and body image, and eating behavior). The results have shown that the body image has a higher association with what was disclosed by the female group, in contrast to what the male group verbalized.

It was observed that the common ground of all research is the fact of applying the tools and evaluating some critical variables related to DT1, such as BMI evaluation, glycated hemoglobin, and insulin use, to ascertain the possible metabolic changes and the disordered eating behavior. A research [38] quoted the importance of analyzing the sociodemographic data with emphasis on the age group and sex as relevant variables to correlate with BMI and glycated hemoglobin.

Another observation is related to the age group and the type of diabetes. The study [15] explored a younger public beginning at nine years old with DT1; In contrast,

the study ^[17] explored a younger public and adults with an age limit of 84 years old with DT2. Therefore, the tolls have sown themselves as essential for identifying disordered eating behaviour or eating disorders of adolescents and adults afflicted by DT1, thus possibly contributing to the prevention of possible complications related to this type of grievances.

It is essential to highlight some limitations of this review before any external generalization. The analyzed studies did not employ the same psychometric instrument in all their investigations. Overall, the authors employed four different scales, however, in the same population: adolescents with type 1 diabetes. Even though we have conducted a broad sweep of the central databases, publication bias is possible because some industry privately own some scales own some scales. Pharmaceuticals. In this point of view, the scales can be marketed to the public and are not necessarily published in scientific journals.

CONCLUSION

Based on the scales analyzed, we have concluded that adolescents with type 1 diabetes achieve high scores that indicate risk for eating behavior and eating disorders. Both eating phenomena are related to variables such as female gender, BMI, and glycated hemoglobin in adolescents with type 1 diabetes.

ARTICLE HIGHLIGHTS

Research background

The disordered eating behavior (DEB) is related to actibehaving on a diet or to feast, compulsive eating, or purging (inefficient use of laxatives, diuretics, and self-induced vomit) and its frequency has become considerably higher in the last years at different parts of the world

Research motivation

The knowledge of validated instruments that examined disordered eating behavior and eating disorders of adolescents with type 1 Diabetes may subsidize prevention actions for potential risks to altered eating habits

Research objectives

To identify and analyze the validated instruments that examine the disordered eating behavior and eating disorders among adolescents with Type 1 Diabetes.

Research methods

It is an integrative review of the literature conducted from February to April 2021 on a single desktop machine

Research results

We have concluded that the most used psychometric scale for analyzing eating behavior and risk for eating disorders is the DEPS-R.

Research conclusions

Therefore, the tools have shown themselves as essential for identifying disordered eating behaviour or eating disorders of adolescents and adults afflicted by DT1

Research perspectives

Further studies should be conducted to explore the best scale to study the eating behavior of adolescents with diabetes.

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