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Diabulimia, the associations, and management: A narrative review

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ABSTRACT

The diagnosis of diabetes is a very hard experience and need psychological adaptation, frustration and denial is the result because adaptation is difficult. Disturbed body image, eating disorders, anxiety, and depression are common among patients with type 1 diabetes. Patients may restrict or omit insulin deliberately to reduce weight. Insulin restriction tripled the mortality in patients with type 1 diabetes, the increased death is from both acute and chronic diabetes complications. The current review aimed to assess diabulimia and associated factors. The current review assessed the size of diabulimia, its association with depression and anxiety, and the available weight management including the novel hypoglycemic medications and bariatric surgery. A multi-disciplinary approach is vital for screening, early detection, and management. Less flexible diabetes management and education may alleviate stress and anxiety. Sodium-glucose co-transporter inhibitors and bariatric surgery are promising but are not free from acute complications especially ketoacidosis.

1. INTRODUCTION

Type 1 diabetes continues to increase worldwide, with an annual incidence of 98,200 in under 15 years [1]. The incidence varies greatly depending on the current level, region, ethnicities, and environmental factors including viral infections, latitude-ultraviolet B-vitamin D pathway, breastfeeding, and increasing childhood obesity [2]. The management of type 1 diabetes needs consideration of the child's development and needs to be adapted according to the patients' needs and circumstances, insulin, individualized nutritional therapy, and exercise are essential for the prevention of long and short-term complications [3]. There is an increasing rate of type 2 diabetes among the young age group mirroring the increasing obesity and insulin resistance, both in

utero exposure and maternal obesity are to blame, the most convenient time for the prevention of this nightmare is within the first three years of life [4]. There is a piece of evidence that obesity contributes to insulin resistance and cardiometabolic consequences in type 1 diabetes, therapeutic interventions are needed to address the cardiac and metabolic complications within the context of insulin use [5].

2. Patients and Methods

We searched PubMed, MEDLINE, Cochrane Library, and Google Scholar for relevant articles published in English from December 2011 up to December 2021, 5301 articles were retrieved and only fifty-five articles were included in the review. We included only articles published on humans. Case reports, animal and experimental studies were excluded. The terms used were type 1 diabetes, diabulimia, insulin omission, anxiety, depression, diabetes distress, obesity, Disturbed body image, obesity medications, diet, exercise, and weight management with Protean AND or OR.

3. Diabulimia: The size of the problem, obesity among patients with type 1 diabetes associations, and possible treatment.

3.1 Overweight and obesity among children with type 1 diabetes

Although obesity is historically linked to type 2 diabetes. However, 13.1% to 20.5% of patients with type 1 diabetes are obese and 22.1% of children with type 1 diabetes are overweight vs. 16.1% of their counterparts without diabetes. The prevalence of obesity varies considerably depending on age, country, and the definition (from 2.8% and 37.1%)

Type 1 diabetes is not protective against insulin resistance and obesity the obesogenic environment, insulin, hypoglycemia management, and improving glycemic control contributed to the annual increase among youth with type 1 diabetes (4% annually, however, rates plateaued in some countries) [6], [7]. Although physical activity is beneficial for weight, physical and mental wellbeing, bone mineral density, and cardiovascular disease, the fear of hypoglycemia (especially nocturnal) is a major barrier. In addition, dietary modifications are faced with the need for snacks to avoid nocturnal hypoglycemia [8-10]. Due to the lack of proper guidance from health providers, the recommendations of one-hour rigorous physical activity are rarely met, barriers were fear of hypoglycemia, out-of-range blood sugar, and hypoglycemia during or after exercise necessitating carbohydrates consumption [11- 14]. Studies suggested that obesity is associated with type 1 diabetes; furthermore, earlier obesity is linked to earlier type 1 diabetes development [15], [16]. The temporal association between obesity and type 1 diabetes was observed by various previous studies [17], [18].

3.2 The cross-talk negative relationship between obesity and type 1 diabetes

Increasing weight increase the demand on β cells to secrete more insulin putting more stress (accelerator hypothesis). In addition, ectopic lipid deposition, inflammation, and oxidative stress play an important role [19], [20]. Transient receptor potential vanilloid-1 induced by insulin resistance and obesity was shown to mediate pancreatic inflammation and increase obesity inducing a vicious cycle. In addition, the disruption of gut microbiota in obesity contributed to autoantibody induction with unknown mechanisms [21- 24].

3.3 Depression, anxiety, and diabetes distress among youth with type 1 diabetes

Nearly one in three children with type 1 diabetes are affected by depression and anxiety that negatively impacted their glycemic control [25]. Type 1 diabetes is considered a family disease and recent literature showed that parental anxiety, depression, and distress are associated with depression in their children and poor glycemic control [26]. High prevalence of depression and anxiety were reported among children with type 1 diabetes mellitus and their parents [27], [28]. Further study showed a high prevalence of anxiety,

depression, and disordered eating among patients with type 1 diabetes with females more affected [29]. There is a piece of evidence about a higher cognitive decline among patients with type 1 diabetes, the interaction between executive function decline and psychological factors is detrimental to diabetes self-care [30].

3.4 Disturbed body image among patients with type 1 diabetes

Youth with type 1 diabetes face challenges of dietary restrictions, exercise, and insulin use, in addition, eating disorders, anxiety, and depression are common. Inappropriate measures including medications use and exercise are commonly used as compensatory measures for weight management; on the other hand, insulin omission may be used as purgative behavior to control weight among those with eating disorders [31, 32]. The interaction between blood glucose, insulin, emotion, disturbed body image, and eating disorders is complex and is the culprit for poor glycemic control and diabetes complications [33].

3.5 Diabulimia

Diabulimia is the most dangerous eating disorder worldwide [34] and is defined as deliberate insufficient insulin injection for weight loss [35], the prevalence of eating disorder among children with type 1 diabetes is 7% and one in five females may be affected; variations in glycemic control and weight are pointers. However, a collaboration between diabetes teams, psychologists, nurses, family members, and school personnel is needed for the earlier detection and appropriate management [36], [37].

3.6 Weight management among children with type 1 diabetes

With a high suspicion rate and screening, the patients are advised to adhere to a regular eating pattern and titrate insulin gradually.

4. Diet and exercise

Although important in the management to prevent serious complications, drug list, food banning, an overemphasis on weight may be harmful. A flexible less rigid approach like the dose adjustment for the normal eating protocol (a training course fitting diabetes into a patient's life and not the reverse), less time on diabetes management during the day may alleviate stress. Patients, family psychoeducation (including the temporary insulin edema), early detection, and referral of those with depressive symptomatology are beneficial. Group membership, carbohydrate counting within-group, and cognitive therapy were found to be helpful in diabulimia recovery. A written weight/diet plan with realistic glucose targets with insulin carbohydrate counting is essential [38- 40].

Bariatric surgery and novel antidiabetic medications are promising for weight reduction, decreased insulin requirement, and cardiovascular risk reduction [18].

5. Bariatric surgery and type 1 diabetes

Bariatric surgery increases neuropeptide-Y, glucagon-like peptide-1, insulin, and bile acids and decreases Ghrelin, leading to glycemic control together with weight loss [41]. Although, bariatric surgery induces type 2 diabetes remission, however, the results on type 1 diabetes are contradicting [42]. [43] showed no improvement in glycemic control despite weight loss, supporting the results of Hussein et al. in their review and meta-analysis [44]. On the other hand, Chow et al. and Faucher et al. showed improvement [45], [46]. The results from the meta-analysis are contradicting with some showing improved glycemic control and cardiometabolic risk factors and decreased insulin dose [46], [47] and others showing no improvement [44].

6. Novel antidiabetic medications and type 1 diabetes

Sodium-glucose co-transporter-2 (dapagliflozin and empagliflozin) [48], [49], and sotagliflozin [50], [51]

(dual sodium-glucose co-transporter inhibitor) were shown to improve glycemic control and time in the range and reduce weight in type 1 diabetes without increasing the risk of hypoglycemia. However, high patient selection and careful down titration of insulin are needed to prevent ketoacidosis and hypoglycemia risk. incretin-based drugs were also shown to reduce weight and insulin requirements among patients with type 1 diabetes [52]. Similar results were observed with metformin use [53]. However, dipeptidyl peptidase-4 (DPP-4) failed to show the same [54], [55].

7. Conclusion

Diabulimia is common and associated with acute and chronic complications of diabetes tripling the mortality. A multi-disciplinary approach is vital for screening, early detection, and management. A lees flexible diabetes management and education may alleviate stress and anxiety. Sodium-glucose co-transporter inhibitors and bariatric surgery are promising but are not free from acute complications especially ketoacidosis.

Conflicts of interest: The authors declare no conflicts of interest.

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