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# Prevalence of Disordered Eating Behaviors in Type-1 Diabetic Patients

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## Abstract

**Background:** Type 1 diabetes mellitus (T1D) is a chronic disease that leads to the destruction of insulin-producing pancreatic beta cells. It is commonly treated with insulin, and weight gain is a common side effect as glycemic control improves. Thus, individuals with T1D are more likely to develop comorbid disordered eating behaviors (DEBs) or eating disorders (EDs), owing to required food monitoring and other features of T1D treatment. Type 1 diabetes increases the likelihood of eating disorders, notably disordered eating behaviors, which have a major impact on blood glucose levels and can result in short- and long-term consequences. As part of the diabetic management, individuals with T1D must concentrate on nutritional intake, portion control, and carbohydrate counting. Eating disorders in type 1 diabetic patients are severe and are associated with severe morbidity and worse treatment outcomes. This study aimed to measure the prevalence of eating disorder behaviors among Saudi patients with type 1 diabetes. **Methods:** This cross-sectional study included 150 male and female patients with T1D (aged 14-50 years) recruited from the Diabetes Treatment Center (DTC) in Riyadh's Prince Sultan Military Medical City (PSMMC) in Riyadh, Saudi Arabia. Participants completed the Diabetes Eating Problem Survey–Revised (DEPS-R) questionnaire. Hemoglobin A1c (HbA1c), in addition to clinical, anthropometric, and sociodemographic information, was another measure. The data analyzed by using the SPSS version 23. Descriptive statistics were conducted including the study variables. **Results:** DEBs were present in 26.8% % of T1D patients. The percentage of DEBs was higher in females (32.0%) compared to males (17.9%). Higher HbA1c and BMI was seen in participants with DEBs ($p < 0.001$). The association between DEB and age, type of insulin, smoking, BMI and duration of diabetes among the studied population was not statistically significant. **Conclusion:** This study represents the first use of the diabetes-specific DEPS-R score in Saudi Arabia. The findings of this study should be viewed as an initial step toward creating customized and successful intervention plans to enhance eating behaviors in individuals with type 1 diabetes. It is recommended to develop educational programs to increase awareness of nutrition in relation to body weight.

**Keywords:** DEBs, T1D, Saudi, nutrition

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## Introduction

Type 1 diabetes mellitus (T1D) is a chronic disease that leads to the destruction of insulin-producing pancreatic beta cells (Sawyer et al., 2022). It is relatively common in the world, affecting one out of every 300 people and increasing at a rate of roughly 3% each year (17). People with T1D require lifelong insulin replacement with multiple daily insulin injections, or the use of an automated insulin delivery system.

Type 1 diabetes causes a variety of health consequences, including weight gain (1 American Diabetes Association, 2020). As a result, individuals with T1D are more likely to have comorbid disordered eating behaviors (DEBs) or eating disorders (ED), due to the need for dietary monitoring and other features of treatment T1D (8). Disordered eating behavior (DEB) is a broad term that encompasses binge eating as well as a variety of compensatory energy-eliminating activities such as self-induced vomiting, laxative usage, diet pills, diuretics, and compulsive exercise for weight loss (20). Diabulimia is a term used to describe the combination of type 1 diabetes with an eating issue. The disorder is distinguished by the patient's deliberate use of insufficient insulin to control their body weight (insulin restriction). Other disordered eating behaviors, such as dietary restriction, self-induced vomiting, and binge eating, may occur, although classic anorexia nervosa is uncommon. Many studies have indicated that patients with T1D are more likely to acquire mental health problems (9 & 10). Disordered eating behaviors are one of the most common mental health comorbidities of type 1 diabetes (16).

Disordered eating behavior is a substantial morbidity among patients with type 1 diabetes. Even when all diagnostic criteria for an eating disorder are not met, it is still associated with poor metabolic control and diabetes-related consequences. Type 1 diabetes increases the likelihood of eating disorders, notably disordered eating behaviors, which have a major impact on blood glucose levels and can result in short- and long-term consequences.

The prevalence of eating disorders among teenagers with type 1 diabetes is reported to be 7%. (21). Disordered eating behaviors (DEBs), including diagnosable eating disorders, are quite common in the context of diabetes and can directly interfere with appropriate diabetes treatment (17). Among the most frequent mental health comorbidities of type 1 diabetes are disordered eating behaviors (DEB) and eating disorders (ED). DEB is common in teenagers and has been linked to low self-esteem, body dissatisfaction as a result of a high BMI, depression, and parental eating disorders. Disordered eating behavior is overrepresented in young adults with type 1 diabetes and is associated with considerable unfavorable health implications.

Peterson and colleagues (2018) proposed a modified dual pathway approach to evaluate the risk variables for acquiring DEB in patients with T1D(14). They anticipated that diabetes duration, disturbance to hunger and fullness due to exogenous insulin injection, and blood glucose variations enhance the risk of DEB in persons with T1D.

The T1D treatment regimen is extensive and multifaceted, requiring patients (and their families) to adhere to various disease-specific habits beginning with diagnosis, such as lifetime insulin replacement therapy, blood glucose monitoring, dietary management, physical activity, and exercise (7). Type 1 diabetes and its management necessitate significant changes in the patient's lifestyle and frequently has a negative impact on the patient's psychosocial well-being. Type 1 diabetes management is a psychologically complex process that necessitates adherence to a demanding structured plan that includes a prescribed pharmacological regime (e.g., multiple daily insulin therapy), regular blood glucose monitoring, proper nutritional management (e.g., carbohydrate intake monitoring), and regular physical activity (4).

As part of the diabetic management, individuals with T1D must concentrate on nutritional intake, portion control, and carbohydrate counting. Patients with type 1 diabetes who suffer from

severe eating disorders have worse treatment outcomes and higher rates of morbidity (5). This study aimed to measure the prevalence of eating disorder behaviors among Saudi patients with type 1 diabetes.

## Methods

### Procedure

Ethical approval was obtained from the Ethical Committee of Prince Sultan's Military Medical City (PSMMC) in Riyadh before the study was conducted. All study participants were provided with informed written consent before study enrollment. The confidentiality of personal identification and demographic data was assured so that participation was entirely voluntary.

### Participants

This cross-sectional study included 150 male and female patients with T1D (aged 14-50 years) recruited from the Diabetes Treatment Center (DTC) in Riyadh's Prince Sultan Military Medical City (PSMMC) in Riyadh, Saudi Arabia (Reference Number: HP/01-R079). The Diabetes Treatment Center (DTC) is an adult's outpatient clinic (approximately 1300) with T1D which provides treatment, consultation and follow-up of T1D patients. The participants were enrolled during a routinely scheduled diabetes education clinic and diabetes follow-up clinic. The exclusion criteria included Type 2 DM, illiteracy, severe mental illnesses or malignant disease, and pregnant woman.

### Study measures

Data was collected from November 2021 to June 2022 through a self-administered questionnaire. A valid Arabic version of the questionnaire, The Diabetes Eating Problem Survey–Revised (DEPS-R), developed by Markowitz et al., 2010 was used in this study.

The DEPS-R is a 16-item instrument which measures core eating disorder behaviors, diabetes control, insulin misuse, and other compensatory behaviors.

The first section of the questionnaire included demographic information and clinical data during patient assessment (including age, gender, weight, height, BMI, education level, marital status, and smoking status) through an interview by the investigator. The latest measurements of HbA1c, insulin regimen (multiple daily injections, insulin pump, or others), and systolic and diastolic blood pressure were also collected from the medical record.

The second section of the questionnaire is DEPS-R, a diabetes-specific screening tool for disturbed eating with 16 items. Responses scored on 6-point Likert-type items, where "0" represents "never," and "5" represents "always." The total DEPS-R score can range from 0 to 80, with a cutoff point at 20 or above, with a higher score indicating a higher risk for an ED.

### Data analysis

Statistical analysis of the data was conducted using the SPSS software, version 23.0. Descriptive statistics—frequency, count, and percentage—were used to determine the associations between categorical variables and the risk of developing eating disorders. Means and standard deviations were reported for continuous variables, counts and percentages for categorical variables. For inferential statistics, chi-square was performed to test the relationship among categorical variables. For normally distributed variables, Pearson's coefficient was utilized to evaluate the correlation between the DEPS-R score and other variables; for non-normally distributed variables, Spearman's Rho was employed. Significance was set at $p < 0.05$.

## Results

Table 1 shows the participants' demographic and clinical characteristics. The majority of the participants were aged 14–18 years (n = 47, 31.3%), female (n = 80, 53.3%), single (n = 116, 77.3%). As for participants' educational level, most had a high school education (n = 74, 49.3%), followed by bachelor (n = 51, 34.0%).

Table 1 Demographic and treatment characteristics of the participants.

| Baseline Characteristics | | count | % |
|---|---|---|---|
| Gender | Male | 70 | 46.7 |
| | Female | 80 | 53.3 |
| Age (n = 150) | 14 - 18 years | 47 | 31.3 |
| | 19 - 23 years | 34 | 22.6 |
| | 28 - 24years | 33 | 22.0 |
| | 29 - 33 years | 24 | 16.0 |
| | 34 - 40 years | 12 | 8.0 |
| Marital Status (n = 150) | Single | 116 | 77.3 |
| | Married | 30 | 20.0 |
| | Widow | 2 | 1.3 |
| | Divorce | 2 | 1.3 |
| Education | High school | 74 | 49.3 |
| | Diploma | 24 | 16.0 |
| | Bachelor | 51 | 34.0 |
| | Master | 1 | 0.7 |
| Weight | 30 – 60 kg | 70 | 46.7 |
| | 61 – 90 kg | 68 | 45.3 |
| | > 90 kg | 12 | 8 |
| Height | 140 – 155 cm | 28 | 18.7 |
| | 156 – 170 cm | 87 | 58.0 |
| | > 170 cm | 35 | 23.3 |
| HbA1C | 6 – 8.9 | 72 | 48.0 |
| | 9 – 11.9 | 63 | 42.0 |
| | > 11.9 | 15 | 10.0 |
| Type of insulin | MDI | 132 | 88.0 |
| | IP | 18 | 12.0 |
| BMI | < 18.5 | 15 | 10.0 |
| | 18.5 – 24.9 | 67 | 44.7 |
| | 25 – 29.9 | 47 | 31.3 |
| | ≥ 30 | 21 | 14.0 |
| BP-systolic | ≤ 120 | 59 | 39.3 |
| | 120 - 140 | 85 | 56.7 |
| | > 140 | 6 | 4.0 |
| BP-diastolic | ≤ 80 | 101 | 67.3 |
| | > 80 | 49 | 32.7 |
| Smoking | Yes | 11 | 7.3 |
| | No | 139 | 92.7 |
| duration of Diabetes | < 10 years | 73 | 48.7 |
| | 10 – 20 years | 57 | 38.0 |
| | > 20 years | 20 | 13.3 |

Regarding the weight of study participants, the highest percent was for (30 – 60 kg) by 46.7% of the total sample, followed by (61 – 90 kg) with 45.3%, while 8.0% of the total sample were > 90 kg. Depending on the adjusted BMI, 67 of the participants were classified as normal weight (44.7%), 47 were overweight (31.3%), 21 were obese (14.0%).

About half of the participants reported HbA1C levels between 6 and 8.9, followed by (9 – 11.9) with 42.0% of the total sample, while 10.0% of the total sample were > 11.9.

Regarding the type of insulin, the highest percent was for MDI by 88.0% of the total sample, while 12.0% of the total sample were IP.

The highest percent of BP-systolic was 120 – 140mmhg by 56.7% of the total sample, followed by ≤ 120mmhg with 39.3% of the total sample, while 4.0% of the total sample were > 140mmhg. The highest percent of BP-diastolic was ≤ 80mmhg by 67.3% of the total sample, followed by ≤ 120mmhg with 39.3% of the total sample, while 4.0% of the total sample were > 140mmhg.

Approximately 50% of participants reported diabetes duration less than 10 years, followed by 38% for 10 – 20 years.

The mean score for the DEPS-R overall was 16.2 ± 10.4. A DEPS-R score of ≥ 20 was found in 26.8% of participants overall, indicating a high risk of developing DEBs. The DEBS-R was significantly higher in females (32.0%) than in males (17.9%). Higher HbA1c was seen in participants with DEBs ($p < 0.001$). Moreover, higher BMI values was seen in participants with DEBs ($p < 0.001$). The association between DEB and age, type of insulin, smoking, BMI and duration of diabetes among the studied population was not statistically significant.

The total DEPS-R score was found to be correlated with both BMI (females: $r = 0.412$, $p = 0.213$) and HbA1c (females: $r = 0.375$; males: $r = 0.489$; $p < 0.001$ in both). This correlation was based on the bivariate correlation of the DEPS-R score with other variables.

**Discussion**

Using the diabetes-specific DEPS-R scale, the current study estimated the prevalence of DEBs

in a sample of T1D patients in Saudi Arabia. The findings of DEBs prevalence were higher among female by 32.0 percent of 150 participants. Although this prevalence is comparable to Roohafza et al from Iran, which reported a higher percentage of diabetic girls are likely to have eating disturbances 67.9% (19) and Wisting's findings from Norway, which reported a higher prevalence of DEB among female by 24.8 percent , this percentage significantly higher than those obtained from Oslo University in Norway 9.59 percent (21). The current study's higher prevalence among females could be due to gender imbalances in illness perceptions have also been observed in allergic rhinitis, where adult females generally rated their condition as more dangerous than did males.

Comparable to the prevalence previously reported in T1D from Norway (18.3%) and the United States (21.2%), the prevalence of DEB in this study was 26.8% (21) .To the best of our knowledge, this is the first report on the prevalence of DEB in the T1D population in Saudi Arabia that uses the DEPS-R scale. Based on a review of the literature from the Arab world, there is a limited data available in this regard. 17.4% of the sample as a whole on the eating attitude test and 32.6% on the Eating Disorder Examination Questionnaire (EDE-Q6) tested positive for DEB, according to a recent study on 138 young Egyptian patients with T1D.

Participants with DEBs in this study had higher BMI and HbA1c values, which is consistent with other studies (3 & 20).

Association between DEB, and age, HbA1C, type of insulin, smoking, BMI and duration of diabetes among the studied population are statistically not significant, which is in contradiction of the Wisting's findings that show significant associations between eating disorder psychopathology, age, BMI, and HbA1c (22).

Even though the study shows that females are more likely to suffer from eating disorders, this is also a limitation because the findings do not apply to all females in Saudi Arabia.

BMI was calculated by using self-reported height and weight data, which may be problematic because people often report being healthier and thinner than they actually are. Future research will benefit from evaluations of dietary habits (number of meals and snack consumption), as well as psychological and psychiatric evaluation using validated questionnaires.

**Conclusion**

This study represents the first use of the diabetes-specific DEPS-R score in Saudi Arabia. According to this study, females had a significantly higher DEBS-R score than males.

Individuals diagnosed with type 1 diabetes, particularly those who are female and have a high body mass index, are more likely to experience disordered eating behaviors. In particular for diabetic patients, routine screening for DEBs ought to be a crucial component of diabetes care.

The findings of this study should be viewed as an initial step toward creating customized and successful intervention plans to enhance eating behaviors in individuals with type 1 diabetes. It is recommended to develop educational programs to increase awareness of nutrition in relation to body weight.

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**Ethics**

Ethical approval was obtained from the Ethical Committee of Prince Sultan's Military Medical City (PSMMC) in Riyadh (Reference Number: HP/01-R079).

**Competing Interests**

The authors declare no competing interests.

**Availability of data and materials**

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request. Peterson

## References


1 American Diabetes Association. (2020). 9. Pharmacologic approaches to glycemic treatment: Standards of Medical Care in Diabetes—2020. Diabetes care, 43(Supplement_1), S98-S110.

2 Broadley, M. M., White, M. J., & Andrew, B. (2018). Executive function is associated with diabetes-specific disordered eating in young adults with type 1 diabetes. Journal of Psychosomatic Research, 111, 1-12.

3 Cherubini V., Skrami E., Iannilli A., Cesaretti A., Paparusso A.M., Alessandrelli M.C., Carle F., Ferrito L., Gesuita R (2018). Disordered eating behaviors in adolescents with type 1 diabetes: A cross-sectional population-based study in Italy. Int. J. Eat. Disord. 2018;51:890–898. doi: 10.1002/eat.22889.

4 Chiang, J. L., Maahs, D. M., Garvey, K. C., Hood, K. K., Laffel, L. M., Weinzimer, S. A., ... & Schatz, D. (2018). Type 1 diabetes in children and adolescents: a position statement by the American Diabetes Association. Diabetes care, 41(9), 2026-2044.

5 Corbett, T., & Smith, J. (2020). Disordered eating and body image in adolescents with type 1 diabetes. Diabetes Care Child Young People, 9, DCCYP053.

6 Delamater, A. M., de Wit, M., McDarby, V., Malik, J. A., Hilliard, M. E., Northam, E., & Acerini, C. L. (2018). ISPAD Clinical Practice Consensus Guidelines 2018: Psychological care of children and adolescents with type 1 diabetes. Pediatric diabetes, 19, 237-249.

7 Disturbed eating, illness perceptions, and coping among adults with type 1 diabetes on intensified insulin treatment, and their associations with metabolic control

8 Francisco, R. (2022). Type 1 diabetes and disordered eating behavior. In Hidden and Lesser-known Disordered Eating Behaviors in Medical and Psychiatric Conditions (pp. 253-259). Springer, Cham.

9 Garcia, S. C., Mikhail, M. E., Keel, P. K., Burt, S. A., Neale, M. C., Boker, S., & Klump, K. L. (2020). Increased rates of eating disorders and their symptoms in women with major depressive disorder and anxiety disorders. International Journal of Eating Disorders, 53(11), 1844-1854.

10 Mairs, R., & Nicholls, D. (2016). Assessment and treatment of eating disorders in children and adolescents. Archives of Disease in Childhood, 101(12), 1168-1175.

11 Marathe, P. H., Gao, H. X., & Close, K. L. (2017). American D iabetes A ssociation S tandards of M edical C are in D iabetes 2017.

12 Meadows A, Hyder S, Guenthner G, Pozzo A. 3.59 Pilot psychiatric screening for patients with type 1 diabetes. J Am Acad Child Adolesc Psychiatry. 2018;57(10):S201.

13 Pesut, D., Raskovic, S., Tomic-Spiric, V., Bulajic, M., Bogic, M., Bursuc, B., & Peric-Popadic, A. (2014). Gender differences revealed by the B rief I llness P erception Q uestionnaire in allergic rhinitis. The clinical respiratory journal, 8(3), 364-368.

14 Peterson, C. M., Young-Hyman, D., Fischer, S., Markowitz, J. T., Muir, A. B., & Laffel, L. M. (2018). Examination of psychosocial and physiological risk for bulimic symptoms in youth with type 1 diabetes transitioning to an insulin pump: a pilot study. Journal of Pediatric Psychology, 43(1), 83-93.

15 Priesterroth, L., Grammes, J., Strohm, E. A., & Kubiak, T. (2022). Disordered eating behaviours and eating disorders in adults with type 1 diabetes (DEBBI): rational and design of an observational longitudinal online study. BMJ open, 12(9), e064863.

16 Pursey, K. M., Hart, M., Jenkins, L., McEvoy, M., & Smart, C. E. (2020). Screening and identification of disordered eating in people with type 1 diabetes: A systematic review. Journal of Diabetes and its Complications, 34(4), 107522.

17 Robert, A. A., Al-Dawish, A., Mujammami, M., & Dawish, M. A. A. (2018). Type 1 diabetes mellitus in Saudi Arabia: a soaring epidemic. International journal of pediatrics, 2018.

18 Roohafza, H. R., Abdeyazdan, Z., Amini, P., Pahlavanzadeh, S., & Shokouh, P. (2016). Disturbed eating behavior in Iranian adolescent and young females with type-1 diabetes compared to non diabetic peers: A cross-sectional study. Iranian Journal of Nursing and Midwifery Research, 21(5), 547.

19 Salah, N. Y., Hashim, M. A., & Abdeen, M. S. E. (2022). Disordered eating behaviour in adolescents with type 1 diabetes on continuous subcutaneous insulin infusion; relation to body image, depression and glycemic control. Journal of Eating Disorders, 10(1), 1-10.

20 Sassmann H., Albrecht C., Busse-Widmann P., Hevelke L.K., Kranz J., Markowitz J.T., Marshall L.F., Meurs S., de Soye I.H., Lange K. (2015). Psychometric properties of the German version of the Diabetes Eating Problem Survey-Revised: Additional benefit of disease-specific screening in adolescents with Type 1 diabetes. Diabet. Med. 2015;32:1641–1647. doi: 10.1111/dme.12788

21 Winston, A. P. (2020). Eating disorders and diabetes. Current Diabetes Reports, 20(8), 1-6.
22 Wisting, L., Siegwarth, C., Skrivarhaug, T., Dahl-Jørgensen, K., & Rø, Ø. (2020). The impact of psychological aspects, age, and BMI on eating disorder psychopathology among adult males and females with type 1 diabetes. Health Psychology Open, 7(2), 2055102920975969.
23 Wisting, L., Skrivarhaug, T., Dahl-Jørgensen, K., & Rø, Ø. (2018). Prevalence of disturbed eating behavior and associated symptoms of anxiety and depression among adult males and females with type 1 diabetes. Journal of Eating Disorders, 6(1), 1-10.