

Unlocking the Secrets: How Well Do Nutrition and Dietetics Students Understand Diabulimia and Health Literacy?

Abstract

Background: Despite the significant health risks associated with it, diabulimia, which involves the omission of insulin for the purpose of weight control in individuals with type 1 diabetes, remains underrecognized.

Aim: This study assessed diabulimia knowledge in third- and fourth-year nutrition and dietetics students and its relationship with health literacy.

Methods: This cross-sectional study included 231 students (90.5% female) in the 3rd (38.5%) and 4th (61.5%) years of the Nutrition and Dietetics Departments at two universities and was carried out between June and July 2024. A questionnaire covering demographic characteristics, Diabulimia Knowledge Level Scale (DKLS) and Turkish Health Literacy Scale (THLS-32) was administered to the students in person. Data analysis was performed using SPSS 28.0.

Results: DKLS scores of third year students were lower than those of the fourth year students ($p=0.014$). Similarly, THLS-32 scores were higher in fourth year students ($p=0.012$). However, there was no statistical significance in DKLS, THLS-32 scores and THLS-32 classification between the universities ($p=0.307$, $p=0.137$ and $p=0.491$, respectively). No relationship between age, DKLS and THLS-32 was found.

Conclusion: Fourth year students demonstrated higher diabulimia knowledge and health literacy scores, highlighting the impact of advanced education. However, no differences were found between the universities. These findings underscore the need for further research to explore the factors contributing to knowledge and health literacy development, including curriculum design, teaching methods, and clinical training. Additionally, expanding this investigation to include other healthcare professionals could provide a broader perspective of existing gaps in diabulimia awareness and health literacy.

Keywords: Diabulimia; Eating disorders; Diabetes Mellitus; Health literacy

Introduction

Diabetes is recognized as a significant global public health concern due to its rapidly increasing prevalence, associated comorbidities, long-term complications and substantial socio-economic burden on both individuals and healthcare systems (ADA, 2018; Fisher et al., 2019; Saeedi et al., 2020). The incidence of Type 1 Diabetes Mellitus (T1DM) in Türkiye has increased from 5.4 thousand cases in 2000 to 13.4 thousand cases in 2021 (IDF, 2021). Among the complications of diabetes are cardiovascular diseases, neuropathy, nephropathy and retinopathy, all of which adversely affect quality of life and increase healthcare costs. Furthermore, the ongoing medical monitoring, medication expenses and lifestyle changes required for diabetes management place a considerable psychosocial strain on individuals. Within this context, diabulimia emerges as a unique and underrecognized complication of diabetes, posing severe threats to both physical and psychological health (Coleman & Caswell, 2020; Goddard & Oxlad, 2023).

Eating disorders (ED) are cognitive disorders related to food and body weight, characterized by abnormal eating habits (APA, 2013). These disorders encompass a spectrum of conditions, including anorexia nervosa, bulimia nervosa, and binge eating disorder, which have been extensively studied in various populations. In the context of diabetes, eating disorders present unique challenges, as they often intertwine with disease management. It is estimated that approximately 20% of women with diabetes are affected by ED. Moreover, young girls with T1DM are twice as likely to develop ED compared to those without (Philpot, 2013; Gagnon et al., 2017).

One such specific manifestation within this spectrum is "diabulimia," a term used to describe the deliberate reduction and/or omission of insulin doses with the intention of inducing weight loss in individuals with diabetes (Torjesen, 2022; Diabetes UK, 2024). This condition highlights the intersection of disordered eating behaviors and diabetes management, presenting unique risks and complications. Despite its reported frequency, diabulimia has not yet been classified as a distinct disorder in the Diagnostic and Statistical Manual of Mental Disorders - V, though it has gained increasing attention within medical and psychiatric communities in recent years (APA, 2013; Diabetes UK, 2024a).

The etiology of diabulimia remains unclear, although several factors are thought to play a role, including genetics, biology and the environment (Hanlan et al., 2013; Coleman & Caswell, 2020). In individuals with diabetes, ED frequently presents as disordered eating behaviors (DEB), which include binge eating and purging, food restriction, laxative use and excessive exercise (Custal et al., 2014; Philpot, 2013). The management of diabetes can, in certain circumstances, increase the risk of developing ED. These include an increased body mass index (BMI), concerns about shape and body image, difficulties in coping with a long-term condition and the impact of diabetes on self-image and

family interactions (Coleman & Caswell, 2020; Custal et al., 2014). It was found that 25% of individuals with T1DM were at risk of developing diabulimia (Altınok et al., 2017). In a subsequent study conducted in 2021, this rate was found to be 31.8% (Şahin-Bodur et al., 2021). Complications associated with diabulimia increase morbidity and mortality rates among patients. Individuals with diabulimia may experience high blood glucose levels, headaches, fatigue, weakness, glucosuria, weight loss, hypoglycemia, growth failure, osteoporosis, muscle atrophy, vomiting, poor oral health and ketoacidosis (Goddard & Oxland, 2022; Goddard & Oxland, 2023). The rising incidence of diabulimia over recent years indicates the necessity for the implementation of measures to address this issue.

It is recommended that healthcare professionals assess individuals with T1DM for risk factors and symptoms for diabulimia in order to provide appropriate treatment (Loretto et al., 2020; Ribeiro et al., 2021; Zuidwijk et al., 2014). Studies in the literature reveal a consensus that healthcare professionals require greater awareness of this condition (Goddard & Oxland, 2022; Goddard & Oxland, 2023; Poos et al., 2022). To our knowledge, no research has measured the level of knowledge of diabulimia among dietitians or dietitian candidates, who often encounter T1DM patients in their careers. Therefore, this study aimed to investigate the knowledge level of third and fourth year nutrition and dietetics students about diabulimia and explore the relationship of this knowledge with health literacy. Understanding this relationship is crucial, as nutrition and dietetics students are future healthcare professionals who play a pivotal role in managing eating disorders and promoting health literacy. Assessing their knowledge can provide insights into potential gaps in education and inform targeted interventions to enhance their preparedness in addressing complex conditions like diabulimia.

Methods

The present study employed a cross-sectional descriptive methodology and involved a sample of university students aged over 18 years. It was carried out between June 2024 and July 2024 in Istanbul, Türkiye. A cross-sectional design was chosen for its efficiency in collecting data from a large group of participants within a limited timeframe. A total of 294 third and fourth year nutrition and dietetics students from two different universities (one private, one public) in Istanbul formed the population for this study. The sample size was calculated with the EpiInfo program. It was determined to be a minimum of 167 using a frequency of occurrence of the event as 50%, the level of error as 5%, the pattern effect as 1 and the confidence interval as 95%. All students in the third and fourth year of the Department of Nutrition and Dietetics at the two universities were invited to take part in the study.

The following criteria were used to determine which participants were eligible for inclusion in the study: students had to be in their third or fourth year at the Department of Nutrition and Dietetics. The exclusion criteria were as follows: participants were not eligible if they had not completed the Medical Nutrition Therapy in Diseases and Nutrition in Pediatric Diseases courses, or if they had been diagnosed with T1DM. Students diagnosed with Type 1 Diabetes Mellitus (T1DM) and ones with family members diagnosed with T1DM were excluded, as their personal experience with the condition could significantly influence their knowledge of diabulimia, introducing a potential bias. Other chronic diseases were not explicitly excluded as the study's primary aim was to assess general knowledge of diabulimia and health literacy levels among nutrition and dietetics students, rather than to evaluate the influence of specific health conditions on these parameters. Participants were recruited through announcements made in the Department of Nutrition and Dietetics, either via email or posted notices in common areas. Students who met the inclusion criteria were invited to participate voluntarily, and informed consent was obtained from all participants before data collection. Efforts were made to ensure a representative sample by reaching out to a broad group of eligible students across both years.

A face-to-face questionnaire was administered; the questions concerned demographic characteristics (gender, age, presence of chronic disease, etc.), the Diabulimia Knowledge Level Scale (DKLS) and the Turkey Health Literacy Scale-32 (THLS-32). The study adhered to the principles outlined in the Declaration of Helsinki. The study was approved by the Ethics Committee for Non-interventional Clinical Research of XXX University, Faculty of Health Sciences (Approved no. 83).

The researchers adopted an open, neutral attitude during the data collection process to ensure that the participants answered the questions honestly and comfortably. It was made clear to the participants that their answers would not be judged as right or wrong and that they would remain completely anonymous. In addition, verbal or non-verbal cues that could influence participants' answers were avoided. The research team conducted the interviews in a quiet and distraction-free environment. The collected data were stored in a password-protected digital environment accessible only by the research team. All information contained in the data collection forms was digitized and physical copies were securely destroyed. Participants' personal information (name, student number, etc.) was stored in a separate file from the data set and was not added to the data set used for analysis in any way. Participants were assigned unique codes to ensure complete anonymization of the data. This process ensured that the identities of the participants were protected and the research was conducted in accordance with ethical rules.

Diabulimia Knowledge Level Scale (DKLS)

Özdemir et al. (2023) developed a scale to assess the level of knowledge about diabulimia among nurses, other health professionals and individuals training to become health professionals. This five point Likert-type scale (1=strongly disagree, 5=strongly agree) is comprised of 19 items with a minimum of 19 and a maximum of 95 points. A higher score on the scale indicates a higher level of knowledge of diabulimia. DKLS is a tool specially developed to measure the level of knowledge of health professionals and students about diabulimia. In this study, this scale, which is specific to the subject, was selected to measure the diabulimia awareness of nutrition and dietetics students. Since there is no alternative scale in the literature that can be used to measure diabulimia knowledge level, DKLS was considered to be an appropriate choice. For this study, the Cronbach alpha coefficient of the scale was found to be 0.930.

Turkish Health Literacy Scale-32 (THLS-32)

The Turkish Health Literacy Scale was developed by Okyay and Abacıgil (2016). The scale is a five point Likert-type scale comprising 32 items, with a total score ranging from 0 to 50. The THLS-32 evaluation entails the calculation of an index. The formula " $\text{index} = (\text{mean} - 1) \times (50/3)$ " is utilized for the purpose of standardization. The term "mean value" refers to the mean of each item's responses by the individual. When calculating the index, the mean is determined by subtracting the number of questions for which the respondent indicated "no opinion" from the total number of questions. In the event that a respondent indicated "no opinion" in response to more than 80% of the questions, their questionnaire was deemed invalid.

THLS-32 is a comprehensive scale that measures individuals' ability to access, understand and use health-related information. A score of 0–25 points is considered to indicate an "inadequate health literacy" level, while a score of 26–33 points is indicative of a "problematic (limited) health literacy" level. A score of 34–42 points is indicative of an "adequate health literacy" level, and a score of 43–50 points is indicative of an "excellent health literacy" level (Okyay & Abacıgil, 2016). Since this study aims to examine the relationship between diabulimia knowledge level and health literacy, THLS-32, which is a reliable and valid scale to evaluate the level of general health literacy, was selected. Since the THLS-32 was used on university students studying in a health-related field, no special adaptation was needed in terms of its suitability for the population. The Cronbach α coefficient for the scale in the present study was determined as 0.940.

Statistical Analyses

SPSS 28.0 software was used to analyze the data. Categorical data are given as numbers (n) and percent (%), while quantitative data are given as mean ($\bar{X}$) and standard deviation (SD) values. The distribution of variables was verified using the Kolmogorov–Smirnov test. In the case of categorical variables, the chi-squared test was employed, whereas the Mann-Whitney U test was used for

quantitative data. The correlation analysis of age, DKLS and THLS-32 was performed with the Spearman test. All analyses were conducted with a statistical significance level of $p < 0.05$.

Results

The final data analysis of this study included a total of 231 students in the third and fourth years of nutrition and dietetics. The enrollment flowchart of the study is presented in Figure 1.

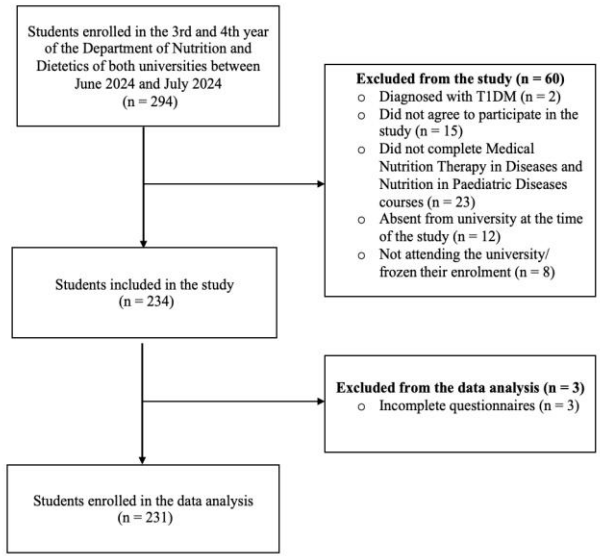


Fig 1. Study enrollment flowchart

Table 1 presents demographic characteristics for the student population. A total of 231 nutrition and dietetics students (90.5% female) participated in the study. The mean age of the students was 22.99 ± 1.90 years. Also 38.5% ($n=89$) of the students were in the third year and 61.5% ($n=142$) in their fourth year. Most students (87.4%) did not report a history of chronic disease.

Table 1. Demographic characteristics

Parameters	Total (n = 231)
Age (year) (mean $\pm$ SD)	22.99 $\pm$ 1.90
Gender [n (%)]	
Male	22 (9.5)
Female	209 (90.5)
Degree of class [n (%)]	
3rd year	89 (38.5)
4th year	142 (61.5)
Presence of a chronic disease [n (%)]	

No	202 (87.4)
Yes	29 (22.6)
Cardiovascular disease	1 (3.5)
Insulin resistance	3 (10.3)
Ulcer/gastritis/reflux	9 (31.0)
Allergy/asthma	16 (55.2)

Table 2 demonstrates the correlation between the DKLS and the THLS-32, classified according to years and universities. Fourth year students had higher DKLS and THLS-32 scores than third year students and there was a statistical difference between them ($p=0.014$, and $p=0.012$, respectively). Furthermore, 49.2% of third year students exhibited problematic health literacy, while 36.0% demonstrated adequate health literacy; statistical differences were observed between years regarding the THLS-32 classification ($p<0.001$). However, there were no statistically significant differences between the universities in terms of DKLS, THLS-32 results or THLS-32 classification ($p=0.307$, $p=0.137$ and $p=0.491$, respectively).

Table 2. The relationship between the Diabulimia Knowledge Level Scale, and the Turkey Health Literacy Scale-32 by year and universities

	3rd year	4th year	p1-value	p2-value
DKLS	69.65 ± 8.83	72.04 ± 11.00	0.014*	0.307
THLS-32	33.69 ± 6.44	36.56 ± 8.43	0.012*	0.137
THLS-32 classification				
Inadequate health literacy	5 (5.6)	11 (7.7)		
Problematic (limited) health literacy	44 (49.4)	57 (40.2)	<0.001**	0.491
Adequate health literacy	32 (36.0)	27 (19.0)		
Excellent health literacy	8 (9.0)	47 (33.1)		

* $p<0.05$, ** $p<0.001$. p1: Differences between 3rd and 4th year, p2: Differences between universities. DKLS: Diabulimia Knowledge Level Scale, THLS-32: Turkey Health Literacy Scale-32

The Spearman correlation analysis results, demonstrate the relationship between age, the DKLS, and the THLS-32. The correlation analysis revealed no statistically significant relationship between age, DKLS, and THLS-32 (Table 3).

Table 3. Correlation between age, Diabulimia Knowledge Level Scale and Turkish Health Literacy Scale-32

	1	2
1. Age	-	-
2. DKLS	r = 0.010 p = 0.875	-
3. THLS-32	r = 0.043 p = 0.515	r = 0.116 p = 0.078

Spearman correlation. DKLS: Diabulimia Knowledge Level Scale, THLS-32: Turkey Health Literacy Scale-32

Discussion

Eating disorders encompass a wide range of conditions, including those that intersect with chronic diseases such as diabetes. Diabulimia, a specific eating disorder characterized by intentional insulin omission, is particularly prevalent among individuals with T1DM, especially during adolescence and young adulthood. Although not formally recognized in the DSM-5, its unique intersection with diabetes-related behavior necessitates greater awareness among healthcare professionals (Coleman & Caswell, 2020; Altınok et al., 2017; Şahin-Bodur et al., 2021). It is important that diabulimia is known, diagnosed and treated by health professionals to reduce the health-related risks of individuals with T1DM (Loretto et al., 2020; Ribeiro et al., 2021; Zuijdwijk et al., 2014). The aim of this study was to determine the level of knowledge about diabulimia and its relationship with health literacy among dietetic students, who will often be involved in the medical nutrition management of T1DM patients.

The limited literature on diabulimia presents significant challenges in raising awareness and ensuring adequate care for affected individuals. Studies, such as Brewster et al. (2020), have highlighted healthcare professionals' limited confidence in recognizing and managing diabulimia, underscoring the need for targeted training programs. Similarly, Goddard and Oxlad (2022) emphasized the importance of equipping healthcare professionals with more comprehensive information about this condition. A study by Callum and Lewis (2014) found that despite its relatively high prevalence among individuals with T1DM, diabulimia is often overlooked by primary healthcare professionals and family members, leading to delays in diagnosis and intervention. In Türkiye, research by Çelik and Öztürk (2023) demonstrated that a high risk of diabulimia correlates with elevated HbA1c levels in adolescents with T1DM, highlighting the clinical consequences of missed or delayed diagnosis.

Finally, Poos et al. (2022) reinforced the critical need for greater awareness among healthcare workers to improve patient outcomes. This study contributes to the existing knowledge base by identifying gaps in diabulimia awareness among nutrition and dietetics students and proposing strategies, such as curriculum enhancements, to address these deficiencies. In the present study, the statistically higher mean DKLS score among fourth year nutrition and dietetics students compared to third year students likely reflects their greater exposure to clinical placements and advanced coursework. This clinical experience enhances their ability to integrate theoretical knowledge with practical applications. Additionally, increased interactions with healthcare professionals and patients during these placements may contribute to better recognition and understanding of complex conditions such as diabulimia. However, the mean diabulimia knowledge score of fourth year students remained at 75.8% of the total score. The absence of significant differences in DKLS and THLS-32 scores between the two universities suggests a standardized and consistent educational approach. Both institutions implement curricula aligned with the Core Education Program and employ faculty members who are experts in their respective fields. These shared standards ensure comparable educational outcomes, regardless of institutional differences, and highlight the robustness of the nutrition and dietetics training programs in preparing students.

Health literacy is a significant determinant of an individual's capacity to achieve and maintain a positive state of health. An individual's capacity to access health information, utilize health services and engage in informed decision-making is dependent upon their level of health literacy, which in turn determines their ability to achieve optimal health outcomes (Okyay et al., 2015; Lestari & Handiyani, 2017). In a study conducted in 5 health and 9 non-health faculties of third year students, health literacy scores of the health department students were found to be statistically higher (Lestari & Handiyani, 2017). In a different study, a health literacy questionnaire (HLQ) comprising nine subscales was administered, with medical students demonstrating the highest scores for seven out of the nine subscales and nursing students exhibiting the lowest scores for all the nine subscales. These findings indicate that health literacy profiles vary between student groups (Mullan et al., 2017). In a study evaluating the health literacy of university students from four different departments related to health sciences, it was found that the health literacy level of nursing and nutrition and dietetics department students was higher than other departments (Şahinöz et al., 2018). The mean score for the fourth year students in the nutrition and dietetics course was found to be statistically higher than that of the third year students. However, the two universities were not significantly different statistically. This may be attributed to the fact that fourth year students are more exposed to courses and practical experiences that develop their ability to understand and apply health-related knowledge. The lack of significant differences between universities indicates consistency in the quality of education provided across institutions, thus ensuring that students receive comparable education and knowledge in

nutrition and dietetics regardless of where they study. Both faculties included in the study have curricula that is in keeping with the Core Education Program; they also have dietitian academic staff who are experts in the field. This may have contributed to the similar results of the students at these two universities. This consistency aligns with findings from other studies that demonstrate the importance of standardized educational practices in promoting equitable learning outcomes. For example, Şahinöz et al. (2018) reported similar patterns of health literacy improvement across health sciences programs, reinforcing the value of uniform curricula in fostering key competencies.

Furthermore, no correlation was identified between the DKLS and THLS-32. The lack of correlation between DKLS and THLS-32 may reflect the different constructs these measures assess. While health literacy emphasizes general competencies in accessing, understanding and applying health information, diabulimia knowledge focuses on a niche area within eating disorders related to T1DM. The relationship between general health literacy and specific knowledge domains like diabulimia may be explained using the Functional Health Literacy model. While general health literacy enables individuals to navigate healthcare systems and understand health information broadly, specific knowledge like diabulimia requires targeted education and clinical exposure. The results demonstrate that while individuals with high levels of health literacy may possess a general understanding of health concepts, this does not necessarily extend to detailed knowledge of specific health conditions such as diabulimia. This distinction underscores the need to incorporate specialized topics such as diabulimia into health education curricula to bridge these gaps. Integrating diabulimia education into the nutrition and dietetics curriculum could significantly improve students' readiness to address this condition in clinical settings. Benefits of such an inclusion include increased awareness, early identification and better patient outcomes. However, challenges such as limited curriculum space and the need for specialized teaching resources must be addressed. Collaborative efforts between educators and healthcare professionals can help overcome these barriers and ensure comprehensive student training.

It is important to note that this study is not without its own limitations. Firstly, it has to be acknowledged that this study was of a cross-sectional nature; as a result, it is not possible to draw conclusions about a cause-and-effect relationship. Secondly, this study relies on self-reported data, which may introduce biases such as recall bias or social desirability bias. Additionally, the findings are based on a specific sample of nutrition and dietetics students, limiting the generalizability of the results to broader populations or other regions. Future studies could address these limitations by incorporating diverse samples and alternative data collection methods, such as objective assessments or longitudinal designs. Another potential limitation is the lack of consideration for confounding factors, such as students' prior exposure to diabetes, which could have influenced their knowledge of

diabulimia. Despite these limitations, there are certain strengths in the study. As far as we are aware, our study represents the first investigation into the level of awareness of the condition known as diabulimia among nutrition and dietetics students and its relationship with health literacy; in addition, it was carried out at two different universities.

Conclusion

In conclusion, this study brings to light the fact that nutrition and dietetics students demonstrate higher levels of knowledge regarding diabulimia and health literacy at the end of the fourth year than their counterparts at the end of the third year. It is our recommendation that the topic of "diabulimia" be included in the curriculum of the primary courses within the Department of Nutrition and Dietetics. This inclusion would facilitate a more comprehensive understanding of diabetes and eating disorders. It is recommended that students in this department be made aware of diabulimia, a condition that may be encountered by them following graduation. The integration of diabulimia into health-related curricula is imperative to equip future healthcare professionals with the knowledge and skills to effectively address this under-recognized yet critical issue. Further research is required to ensure that all health professionals are informed about diabulimia.

References

- American Diabetes Association (ADA). (2018). Economic Costs of Diabetes in the U.S. in 2017. *Diabetes Care*, 41(5), 917–928.
- Fisher, L., Polonsky, W. H., Hessler, D., & Johnson, N. (2019). Emotional distress in adults with type 1 or type 2 diabetes: Results from Diabetes MILES—United States. *Diabetes Research and Clinical Practice*, 143, 27–38.
- Altınok YA, Özgür S, Meseri R, et al. (2017). Reliability and validity of the diabetes eating problem survey in Turkish children and adolescents with type 1 diabetes mellitus. *Journal of clinical research in pediatric endocrinology* 9(4): 323.
- APA, American Psychiatric Association (2013). Diagnostic and statistical manual of mental disorders, fifth edition (DSM-5) Arlington, VA: American Psychiatric Association. 2013.
- Brewster S, Partridge H, Cross C, et al. (2020). Healthcare professional awareness of eating disorders in people with type 1 diabetes: a staff survey. *British Journal of Diabetes* 20(2): 122-129.
- Callum AM, Lewis LM (2014). Diabulimia among adolescents and young adults with type 1 diabetes. *Clin Nurs Stud* 2(4): 12.

- Coleman SE, Caswell N (2020). Diabetes and eating disorders: an exploration of 'Diabulimia'. *BMC psychology* 8: 1-7.
- Custal N, Arcelus J, Agüera Z, et al. (2014). Treatment outcome of patients with comorbid type 1 diabetes and eating disorders. *BMC psychiatry* 14: 1-5.
- Çelik G, Öztürk İ (2023). The Effect of Diet Compliance and Diabulimia Risk on HbA1c Levels in Adolescents with Type-1 Diabetes. *Akdeniz Medical Journal* 9(3): 296-301.
- Diabetes UK (2024a). The World's Most Dangerous Eating Disorder. Available at: <https://www.diabetes.co.uk/in-depth/dcuk-review-diabulimia-worlds-dangerous-eating-disorder/>
- Gagnon C, Aimé A, Bélanger C (2017). Predictors of comorbid eating disorders and diabetes in people with type 1 and type 2 diabetes. *Canadian journal of diabetes* 41(1): 52-57.
- Goddard G, Oxlad M (2022). Caring for individuals with type 1 diabetes mellitus who restrict and omit insulin for weight control: evidence-based guidance for healthcare professionals. *Diabetes Research and Clinical Practice* 185: 109783.
- Goddard G, Oxlad M (2023). Insulin restriction or omission in Type 1 Diabetes Mellitus: a meta-synthesis of individuals' experiences of diabulimia. *Health Psychology Review* 17(2): 227-246.
- Hanlan ME, Griffith J, Patel N, et al. (2013). Eating disorders and disordered eating in type 1 diabetes: prevalence, screening, and treatment options. *Current diabetes reports* 13: 909-916.
- IDF Diabetes Atlas (2021). Available at: <https://diabetesatlas.org/data/en/country/203/tr.html>
- Lestari P, Handiyani H (2017). The higher level of health literacy among health students compared with non-health students. *UI Proceedings on Health and Medicine* 2:141.
- Loretto L, Pes GM, Dore MP, et al. (2020). Eating disorders and diabetes: behavioural patterns and psychopathology. Two case reports. *Rivista di Psichiatria*, 55(4): 240-244.
- Mullan J, Burns P, Weston K, et al. (2017). Health literacy amongst health professional university students: a study using the Health Literacy Questionnaire. *Education Sciences* 7(2): 54.
- Okyay P, Abacigil F, Harlak H, et al. (2015). A new health literacy scale: Turkish health literacy scale and its psychometric properties: Pinar Okyay. *The European Journal of Public Health* 25(suppl_3): 175-220.
- Okyay P, Abacigil F (2016). Reliability and validity study of health literacy scales in Turkey (Türkiye sağlık okuryazarlığı ölçekleri güvenilirlik ve geçerlilik çalışması), Republic of Turkey Ministry of Health.

- Özdemir SÇ, Semerci V, Sarı ES (2023). Development of the diabulimia knowledge level scale. *Archives of Psychiatric Nursing* 46: 139-145.
- Philpot U (2013). Eating disorders in young people with diabetes: Development, diagnosis and management. *Journal of Diabetes Nursing* 17(6): 228-232.
- Poos S, McGowan K, Martin A (2022). A case of diabulimia in a 23-year-old woman with extensive comorbidities. *Stratford Campus Research Day* 4.
- Ribeiro LB, Pieper CM, Frederico GA, et al. (2021). The relationship between women with diabetes and their body: the risk of diabulimia. *Escola Anna Nery* 25: e20200270.
- Saeedi P, Salpea P, Karuranga S, et al. (2020). Mortality attributable to diabetes in 20–79 years old adults, 2019 estimates: Results from the International Diabetes Federation Diabetes Atlas. *Diabetes research and clinical practice* 162: 108086.
- Şahin-Bodur G, Keser A, Şıklar Z, et al. (2021). Determining the risk of diabulimia and its relationship with diet quality and nutritional status of adolescents with type 1 diabetes. *Nutrition Clinique et Métabolisme* 35(4): 281-287.
- Şahinöz T, Şahinöz S, Kıvanç A. (2018). A comparative study on health literacy levels of university senior students. *Gümüşhane University Journal of Health Sciences* 7(3): 71-79.
- Torjesen I (2019). Diabulimia: the world's most dangerous eating disorder. *BMJ* 364: 1982
- Turan H, Kaya DG, Tarçın G, et al. (2022). Diabetes-Specific Eating Disorder in Adolescents: Investigation of the risk of 'Diabulimia' and its metabolic effects. *Ege Journal of Medicine* 61(1): 30-37.
- Zuijdewijk CS, Pardy SA, Dowden JJ, et al. (2014). The mSCOFF for screening disordered eating in pediatric type 1 diabetes. *Diabetes Care* 37(2): e26-e27.

