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A Ten-Year Longitudinal Study of Prevalence of Eating Disorders in the General Polish Type 2 Diabetes Population

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Background: Little has been reported regarding the epidemiology of eating disorders (EDs) in type 2 diabetes (T2DM). We examined the Polish National Health Fund-NFZ database estimates of all medical visits from 2008 to 2017 to determine the trend and the epidemiology of EDs in T2DM patients.





Material/Methods: The NFZ database were used. We defined the T2DM group diagnosed with both T2DM and EDs according to the ICD-10 codes. Demographic data were collected from the webpage of Statistics Poland (GUS). The annual prevalence of EDs was estimated according to the T2DM diagnosis status, and the age groups were stratified into 8 groups

Results: The prevalence of EDs in T2DM patients in the whole patient population with diagnosed T2DM ranged from 0.059% (in 2017) to 0.086% patients (in 2010). Differences in subcategories of EDs were noted. In the case of anorexia nervosa, a decreasing trend of coexistence with T2DM was noted. However, in the case of atypical anorexia nervosa, an increasing trend was observed. Both in the case of bulimia nervosa and atypical bulimia nervosa, an increasing trend of coexistence with T2DM was noted. As patients with T2DM age, the prevalence of EDs in T2DM decreased.

Conclusions: A relatively stable trend of prevalence of EDs in T2DM patients benefiting from state medical care indicated the need to develop effective screening methods and adequate procedures for therapeutic interventions with this group of patients using a multidisciplinary therapeutic team.

MeSH Keywords: **Anorexia Nervosa • Bulimia Nervosa • Diabetes Mellitus, Type 2 • Epidemiology • Longitudinal Studies**

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Background

Type 2 diabetes (T2DM), previously referred to as “noninsulin-dependent diabetes” or “adult-onset diabetes,” accounts for 90–95% of all diabetes cases. This form of DM encompasses individuals who have relative (rather than absolute) insulin deficiency and have peripheral insulin resistance [1]. Current epidemiological data indicate an increase in the frequency of T2DM diagnosis. For example, it was estimated that in 2017 there are 451 million people (age 18–99 years) with diabetes worldwide. These numbers are expected to increase to 693 million by 2045. It was estimated that almost half of all people (49.7%) living with diabetes are undiagnosed. Moreover, there was an estimated 374 million people with impaired glucose tolerance, and it was projected that almost 21.3 million live births to women were affected by some form of hyperglycemia in pregnancy. In 2017, approximately 5 million deaths worldwide were attributable to diabetes in 20–99 years old population. The global healthcare expenditure for people with diabetes was estimated to be USD 850 billion in 2017 [2]. It should be noted that the incidence of T2DM in children and adolescents is increasing, mirroring the epidemic of pediatric obesity [3]. This is observed not only in the United States and Japan, but also in other countries. Depending on the study population, T2DM now accounts for 8%–45% of all new cases of diabetes reported among children and adolescents [4].

In the literature, the need to search for adequate forms of treatment of T2DM is stressed. Currently, treatment of these patients covers insulin therapy and application of adequate diet [1]. In the context of dietetic work with a patient with T2DM, special attention should be paid to the analysis of factors that might impede adherence to dietary recommendations [5]. In some patients, for example, negative attitude towards their own illness has been observed [6], which is of utmost importance for adherence to dietary recommendations. It should be noted that impeding adherence to dietary and medical recommendations might be connected with eating disorders (EDs) coexisting with diabetes, which is observable especially in the case of bulimia and anorexia [7–9]. It is worth remembering that patients with T2DM with coexisting EDs might employ various methods of weight control that are not necessarily those accepted by their doctor and dietician. Some of those methods are: vomiting, use of laxatives, omitting insulin doses, and diet pills [10,11]. These methods are characterized by very low or no glycemic control, and application of these methods of weight control is frequently determined by coexisting overweight and obesity in patients with T2DM. In the SEARCH study by Lawrence et al. [10], it was demonstrated that 37% of girls/women and 32% of boys/men with overweight/obesity had T2DM. It has been shown that people with T2DM applied «unhealthy» methods (for example vomiting, use of laxatives, omitting insulin doses, and diet pills) to reduce weight more often than those with type 1 diabetes.

A systematic review and meta-analysis by Nieto-Martínez et al. [8] evaluated if EDs were risk factors for T2DM. They chose 6 publications out of 1057. The meta-analysis of these 6 studies included patients with T2DM. Among the cross-sectional studies, bulimia [odds ratio (OR) 3.45: 92–6.1] increased the risk of T2DM, while anorexia was not associated with lower risk (OR 0.87: 0.40–1.88). Cohort studies showed increased risk of T2DM with bulimia [relative risk (RR) 1.7: 1.2–2.5], and decreased risk with anorexia (RR 0.71: 0.52–0.98). It has been observed that the prevalence of EDs and T2DM is stable. A low percentage of research on the subject of prevalence of EDs (anorexia and bulimia) has indicated the need to conduct further analyses that would estimate the coexistence of EDs and T2DM. Some of the research has indicated greater prevalence of T2DM coexisting with EDs, especially bulimia, in women compared to men [12]. Analysis of medical problem, with a view to age, also indicated a dependency. It is believed that a greater risk of developing an ED refers to those patients whose diabetes was diagnosed at the age of 7–18 years, compared with patients diagnosed before 7 or after 18 years of age [13].

We still do not know much about the causes of EDs in T2DM. First of all, there have only been a few longitudinal studies about EDs in T2DM compared to type 1 diabetes. Additionally, epidemiological data suggest an increase in the incidence of T2DM [1,2] and difficulties in adherence to medical recommendations in cases of diabetes [5,6]. In this context, the analyses of the prevalence of EDs in T2DM are particularly important. It is worth stressing that lack of available data prevents taking any reasonable action including interdisciplinary treatment of patients with T2DM with a diagnosed ED. There is little research on the evaluation of the prevalence of anorexia in T2DM [8] (the subject undertaken by the authors). In the absence of research, the aim of this paper was to evaluate the prevalence of EDs in T2DM among Polish patients whose treatment was financed by the Polish National Health Fund-NFZ, in the years 2008–2017.

Material and Methods

Source of database

Information reported by healthcare entities to the state payer in Poland (NFZ) on health benefits provided to patients was used for the retrospective data analysis from the period 2008–2017 (based on the existing provisions of law [14–16]). Demographic data were collected from the webpages of Statistics Poland (GUS). Polish National Health Fund-NFZ collects medical data from national and private medical centers that signed a contract with NFZ where medical services are financed from public funds. It should be noted that the collection of medical data by NFZ is regulated by specific legal acts – the Decree of the Minister of Health of 20 June 2008 – on the scope of necessary information

collected by public benefit provider, detailed manner of registering this information, and the transfer to entities authorized to finance health benefits under public funding, which, together with its amending acts, remain in force (the last one dated 01.07.2017). In this regard, the database of medical services conducted by the Polish National Health Fund-NFZ registers all patients benefiting from the medical services financed from public funds [14]. These data are widely accepted to be representative of the entire Polish population, which increases its utility as a source of data for population-based nationwide studies.

Allocation of patients with insulin-dependent diabetes indicated as the main cause of intervention (according to ICD-10=E11; T2DM [16]) was generated from the databases of NFZ. Data on health declarations associated with patient data were analyzed based on a unique patient identification ID (PESEL number in Poland), which was anonymized before analyses.

It is now generally acknowledged that T2DM is diagnosed in adult patients. In the NFZ database there were also T2DM diagnoses in children and adolescents (patients aged 10 to 18 years of age) according to ICD-10. On the basis of these medical diagnoses that were reported to the Polish National Health Fund-NFZ, these patients were included in the general group of patients diagnosed with T2DM analyzed in the presented paper.

All patients with diabetes included in this study benefited from state medical care in the years 2008–2017 under public funding. It is assumed that the majority of patients with diabetes benefit from state medical care executed under public funding because only within state medical care are patients entitled to partial medicine reimbursement, specialized medical examinations, and diabetics care without incurring additional fees. It should be noted that the treatment of diabetes and its complications is very expensive (e.g., hospitalizations, outpatient care, medications). Therefore, in the context of this disease in Poland, this group of patients enjoys the benefits of public funding rather than private funding [17].

Based on data of patients with T2DM, it was further determined (in the period analyzed) whether patients also had ICD-10 codes indicated for ED as the main reason of intervention (according to ICD-10=from F50.0 to F50.3 [16]). Further data analysis was performed on the database including patient data that in the period 2008–2017 had a minimum of 1 indication of a diagnosis according to ICD-10: E11 and from F50.0 to F50.3 [16].

Criteria for patient inclusion to the study were: 1) T2DM diagnosed according to an International Classification of Diseases ICD-10 by a diabetologist [16], 2) ED (F50) diagnosed by a psychiatrist according to ICD-10 [16]; 3) benefiting from state medical care in the years 2008–2017. Adequate consents for data use were obtained from NFZ.

On the basis of the criteria for inclusion for the study, from the whole database of patients with diabetes only patients fulfilling all the criteria aforementioned were included. Data involving state medical services from 2008–2017 in the case of patients with T2DM and coexisting ED were taken into consideration. The aim was a more detailed analysis of the phenomenon discussed. However, in order to determine the current number of patients with T2DM and determining the ratio of patients with T2DM and coexisting ED in relation to the whole population with T2DM, data including the benefit of state medical care in the years 2010–2017 were applied.

Definition of diabetes mellitus and eating disorders (EDs)

All participants who were diagnosed with T2DM according to ICD-10 [16] codes at baseline, and patients over the age of 10 years with a diagnostic code (ICD-10) of T2DM (E11) more than once in a given year from January 2008 to December 2017 were included. All included patients made at least 1 visit to an outpatient care or inpatient care center to diagnose T2DM. We defined the T2DM group diagnosed with both T2DM and ED (F50.0–F50.3) according to the ICD-10 codes at baseline.

Ethical considerations

Our study was a retrospective data analysis from the period 2008–2017 and our data came from a public database. For this reason, we did not require approval from an independent ethics committee (IEC). The authors sought advice from the Bioethics Committee of Medical University of Warsaw to conduct the presented study. As the “commission does not issue opinions on the survey, retrospective and other non-invasive scientific studies”, approval was not required. Data owners have given permission to use the data.

Statistical analysis

The demographic characteristics for the participants were analyzed through descriptive statistics. The annual prevalence of EDs (anorexia and bulimia) was estimated according to the T2DM diagnosis status, and the age groups were stratified into 8 groups (11 to 20, 21 to 30, 31 to 40, 41 to 50, 51 to 60, 61 to 70, 71 to 80, and ≥81 years of age).

Results

The prevalence of EDs in T2DM in the years 2008–2017 in state medical care

Epidemiological data analysis pertaining the prevalence of EDs in T2DM in reference to the whole patient population with diagnosed T2DM demonstrated that the prevalence of

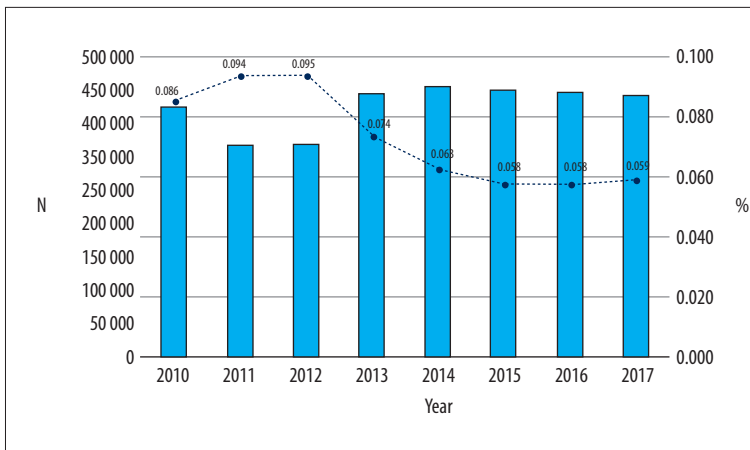


Figure 1. Total number of patients with diagnosed type 2 diabetes (ICD-10 code E11) and the rate participation of diagnosis eating disorders (ICD-10 code F52) in this group of patients in the years 2010–17.

Table 1. The number of patients with diagnosed ED (altogether) and T2DM in a group of primary health care patients in the years 2010–17.

Year	Women		Men		Total
	N	%	N	%	N
2008	233	79.0	62	21.0	295
2009	262	73.6	94	26.4	356
2010	261	72.5	99	27.5	360
2011	256	76.4	79	23.6	335
2012	261	77.2	77	22.8	338
2013	252	77.3	74	22.7	326
2014	208	72.5	79	27.5	287
2015	197	76.1	62	23.9	259
2016	182	71.1	74	28.9	256
2017	180	69.5	79	30.5	259

EDs ranged from 0.059% patients in 2017 to 0.086% patients in 2010 who were in state medical care. Therefore, the prevalence of EDs in T2DM was not a common phenomenon in relation to the whole population of patients with T2DM in state medical care (Figure 1).

Table 1 presents the number of patients with diagnosed EDs (F50) and T2DM (E11) in the years 2008–2017. What can be concluded from this data was that the total number of patients remained at a relatively stable level. Women were the majority in the analyzed group. However, comparing the epidemiological data from 2008 with the data from 2017, the number of men with EDs and T2DM might be growing. Still, women represent a considerable part of the group.

In the context of sex, the number of patients with ED and T2DM was compared in relation to the whole patient population with diagnosed T2DM. It was demonstrated that the prevalence of EDs in patients with T2DM was decreasing both in

women and men. At the same time, the observed slightly decreasing trend was more visible in women (Figure 2). It should be noted, however, that the presented data represents far less than 0.2% all T2DM diagnoses, thus this data represented a relatively regular trend.

The prevalence of anorexia in patients with T2DM in the years 2008-2017 in state medical care

On the basis of epidemiological data obtained, the prevalence of anorexia in patients with T2DM was assessed. In the case of anorexia (Anorexia Nervosa) (F50.0), a decreasing trend of coexistence with T2DM might be observed. However, in the case of atypical anorexia nervosa (F50.1), there was an observable increasing trend. Detailed data are presented in Figure 3.

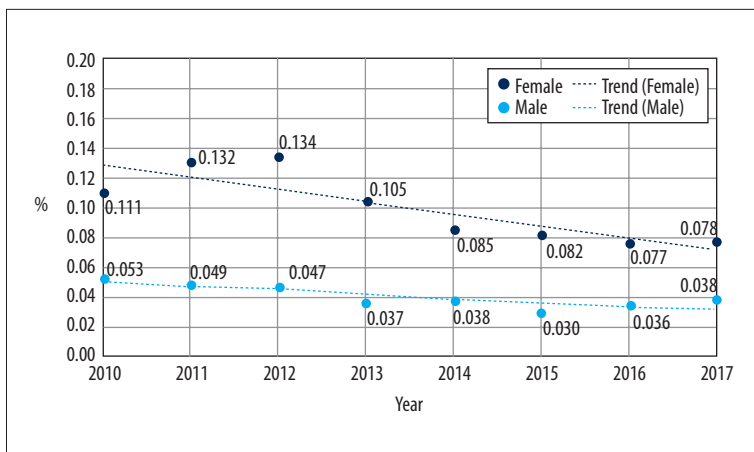


Figure 2. Rate of diagnosis of eating disorders (ICD-10 code F52) among women and men with diagnosed type 2 diabetes (ICD-10 code E11) in the years 2010–2017 in state medical care.

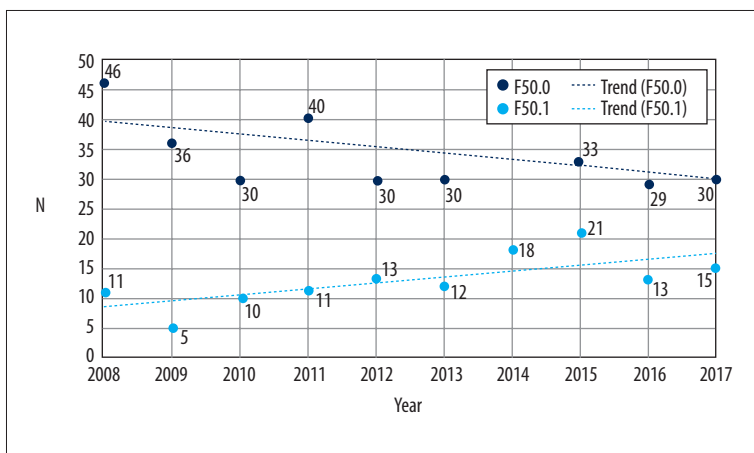


Figure 3. The prevalence of eating disorders ICD-10 code F50.0 (*Anorexia Nervosa*) and F50.1 (*Atypical Anorexia Nervosa*) diagnoses in type 2 diabetes in the following years with the trend line for women and men.

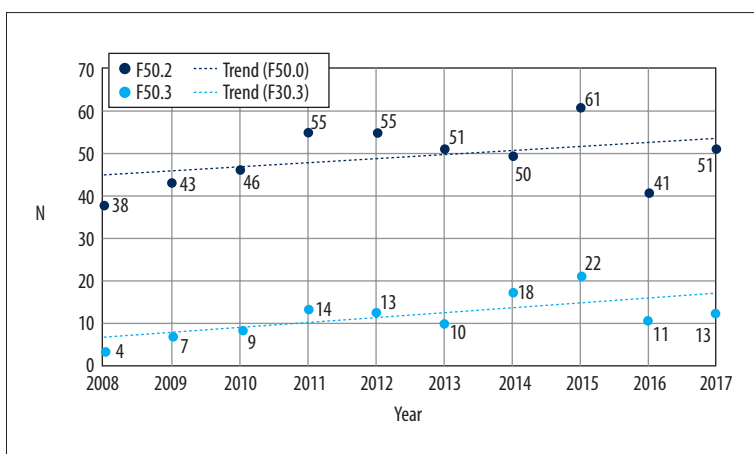


Figure 4. The preference of eating disorders ICD-10 code F50.2 (*Bulimia Nervosa*) and F50.3 (*Atypical Bulimia Nervosa*) diagnoses in type 2 diabetes in the following years with the trend line for women and men.

Prevalence of bulimia in patients with T2DM in the years 2008–2017 in state medical care

On the basis of epidemiological data obtained, the prevalence of bulimia in patients with T2DM was assessed. Both in the case of bulimia nervosa (F50.2) and atypical bulimia nervosa (F50.3), an increasing trend of coexistence with T2DM might be observed. Detailed data are presented in Figure 4.

The prevalence of coexistence of T2DM with EDs in the years 2008–2017 depending on the patient age

When it came to age, the prevalence of EDs in patients with T2DM benefiting from state medical care was varied in each age range, although with varying intensity. It should be noted, however, that the prevalence of EDs was found to decrease with age. The observations discussed were noted in each

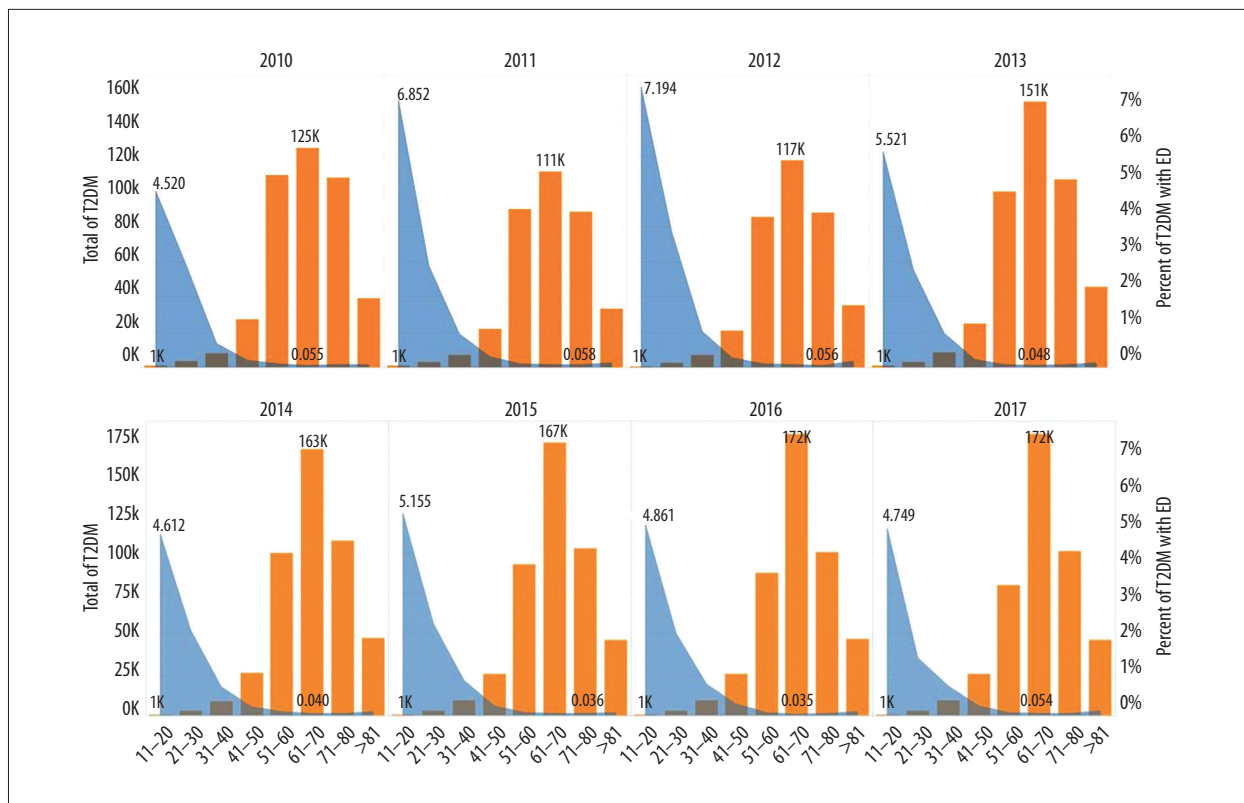


Figure 5. Eating disorders and age groups.

analyzed year from 2008 to 2017. Detailed data are presented in Figure 5. It should be noted that the age ranges with the greatest number of patients receiving state medical care declaring EDs and T2DM did not cover the age structure of patients with diagnosed T2DM.

Discussion

The conducted analyses originating from the state patient register of patients benefiting from state medical care in the years 2008–2017 indicated that the prevalence of EDs in patients with T2DM should be viewed in permille rather than percent, and totaled from 0.058% to 0.095% depending on the year of observation. The trend of coexistence of EDs and diabetes was relatively stable in the years 2010–2017 with a slight downward trend. It should be noted that the presented study results are the second long-term analysis of coexistence of EDs in diabetes presented in the literature. There is no published Polish study in this area. The first epidemiological study on the topic was conducted by Raevuori et al. [12], and it took the authors 16 years to compile their data. It should be noted, however, that in our studies, the coexistence of anorexia and bulimia and their atypical forms were analyzed. Whereas in the study by Raevuori et al. [12], only the coexistence of bulimia and binge eating disorder was analyzed, which is why only a

partial comparison of the 2 epidemiological studies is possible. Our study showed that the prevalence of EDs and T2DM was stable. Our results also presented the relative stability of co-occurrence of ED and T2DM. This finding requires further research.

We concluded that from the analysis and prevalence of EDs (F50) in patients with T2DM (E11) in the years 2008–2017, that the prevalence of EDs in patients with T2DM remains at a relatively stable level. Bearing in mind that while the coexistence of EDs and T2DM is not a commonly occurring phenomenon in patients benefiting from state medical care, the lack of adequate procedures for working with such patients is worth stressing. Coexistence of EDs, especially anorexia and bulimia, creates serious difficulties in therapy for these patients. Such a patient should not only be cared for by a psychiatrist, but also by a diabetologist, therapist, and nutritionist [1]. Care of these patients requires a complex multidisciplinary medical care team. It is worth noting that EDs coexisting with T2DM might impede compliance with medical and dietary recommendations [12,13]. Considering the presented data in our study, it seems reasonable to undertake work aiming at the development of adequate medical and dietary procedures in patients with T2DM with diagnosed coexisting anorexia and bulimia spectrum of EDs. It is important to note that the presented epidemiological data in this study indicated that around 250–350 such patients benefited from state medical care facilities annually.

In the context of sex, epidemiological data demonstrated that EDs in patients with T2DM affected women rather than men to a large extent. However, comparing data from 2008 with the data from 2017, it should be noted that the number of men with T2DM and coexisting ED appeared to be growing. At the same time, women still accounted for a considerable number of patients. This result might be connected with general epidemiological data concerning EDs in the population. According to that data, the discussed disorders, especially anorexia and bulimia, concern women to a large extent [18].

It is worth stressing that in the context of sex, data concerning the prevalence of EDs in patients with T2DM in relation to the whole patient population with diagnosed T2DM demonstrated that the prevalence of EDs in patients with T2DM was 2 times greater in women than in men (0.078% and 0.038%, respectively in 2017). There was another interesting observation indicating that the prevalence of EDs in patients with T2DM had a slight downward trend both in women and men. At the same time, the downward trend was more observable in women than in men.

The conducted analysis of the prevalence of EDs in patients with T2DM demonstrated that bulimia and anorexia coexist with diabetes most often. The presented epidemiological data were in accordance with other research data that reported that bulimia was the most frequently occurring ED in diabetes [8-12].

Our own study results demonstrated that the prevalence of bulimia nervosa and atypical bulimia nervosa in diabetes is a growing trend. Additionally, the presented epidemiological study demonstrated that the incidence of bulimia in populations with T2DM was 0.006%. It should be noted that the first study presenting a significant association of risk between bulimia and T2DM was reported in 2001 by Johnson et al. [19]. This cross-sectional study assessed 4651 participants, mainly females, from 15 health care centers in the USA. The prevalence of bulimia was 0.9%. Participants with bulimia reported more prevalence of T2DM than those with non-ED (9.1% and 2.7%; respectively, $P < 0.05$). However, these research results should be viewed with great caution as there were factors which could have limited the reliability of the studies (e.g., self-administered instruments which increase the proportion of false positives, having not recorded weight, and diabetes diagnosis by self-report). The presented epidemiological data in our study indicated that the prevalence of bulimia in patients with T2DM was much smaller than in the research reported by Johnson et al. [19].

The study by Raevuori et al. [12] provided interesting data on the topic of correlations between T2DM and bulimia. This team of researchers also conducted research involving 2342 patients treated at the Eating Disorder Unit of Helsinki University Central

Hospital over a period of up to 16 years; these patients were compared with matched general population controls ($N=9368$). The prevalence of T2DM at the initial study period was 1.5% in the bulimia group and 0.3% in the non-bulimia group ($P < 0.001$). This study showed that bulimia increased 1.7 times the incidence of T2DM. The lifetime prevalence of T2DM at the end of the study was 4.4% (bulimia group) versus 2.0% (non-bulimia group) ($OR=2.44$: 1.72–3.46) [12]. The multi-annual study provided strong support for the association between T2DM and clinically significant binge eating. Disturbed glucose metabolism might contribute to the onset and maintenance of bulimia.

On the basis of the obtained data in our study, it was demonstrated that in the case of anorexia nervosa (F50.0), a downward trend of coexistence with T2DM might be observed. In the case of atypical anorexia nervosa (F50.1), however, an increasing trend was noted. These data must be interpreted with great caution as there are diagnostic difficulties that psychiatrists face. In comparing and contrasting anorexia nervosa with atypical anorexia nervosa, there is essentially one main difference, the patient's weight. Those with atypical anorexia nervosa can be of normal weight, overweight, obese, or slightly underweight [20]. For the psychiatrist to diagnose anorexia, the patient must meet all diagnostic criteria according to ICD-10 [16]. In the case when at least 1 criterion was not met, atypical anorexia nervosa was diagnosed.

An increasing trend of the coexistence of atypical anorexia nervosa in patients with T2DM might be linked with the increasingly more often observable non-specific symptoms of anorexia. Other explanations could be the fact that anorexia and bulimia are both EDs and they can have similar symptoms, such as distorted body image. However, both are characterized by different food-related behaviors [21]. In some cases, patients with bulimia are replacing their bulimic food-related behaviors with anorectic food-related behaviors.

A downward trend in coexisting anorexia and T2DM was founded in the literature, and it has been stressed that anorexia is relatively rare in T2DM. It is linked, among others, with metabolic disorders, including insulin, which might contribute to weight gain. It should be noted that anorexia nervosa is an ED which is characterized by immoderate food and caloric restriction [22], which might provide clues to examine the association of caloric restriction, by using anorexia nervosa as a proxy, and T2DM in humans. However, research in Sweden has shown that the risks of T2DM were significantly decreased among individuals with anorexia nervosa, as compared to the general population without the disorder. The risk of T2DM was 30% lower in anorexia nervosa patients than in the general population. The risk patterns were similar in both men and women. In addition, by controlling for unmeasured confounding factors using sibling design, the risk patterns were similar but without

significant differences [9]. It is also worth stressing that studies suggest that moderate caloric restriction can effectively prevent the development of T2DM in the general population. Observations involving laboratory animals have shown that caloric restriction could reduce the incidence of T2DM [23]. This correlation is provided as the reason for a lower prevalence of anorexia in T2DM. However, further research is needed.

Interesting observations were made assessing the prevalence of EDs (anorexia nervosa and bulimia) in patients with T2DM in the context of age. The analyses we conducted demonstrated that the coexistence of the discussed diseases prevails in each age range, although it was most prevalent in younger people and declined with age. Special attention must be paid to patients aged 21 to 30 years old because greater prevalence of the coexistence of EDs and T2DM was observed in this age group. In line with Erikson's psychosocial developmental theory, an individual forms strong interpersonal relations in this period [24]. Chronic illness emerging in this period might significantly interfere not only with creating strong social bonds, but also influence self-identity and body image. Distorted body image is particularly visible in T2DM with coexisting ED [25,26]. This, in turn, influences the level of disease acceptance, shaping attitudes towards treatment and adherence to dietary recommendations [26]. What stems from the presented age structure data is that this age group needs special attention. Although they do not form a significant number of patients with T2DM, patients with coexisting EDs constitute a fair number of patients.

It should be remembered that mature adults (e.g., 51 to 60 years of age) with T2DM might also suffer from EDs. Most probably older patients begin to notice other illnesses and recognize sudden health deterioration. What is more, during this age period, patients might experience an important stage of adaptation to new conditions and changes connected with age, and also changes in social roles, including old age pensions. Accepting these biological changes stemming from the natural process of ageing and limitations in fulfilling social roles increasing with age is of key importance for proper functioning of persons older than 50 years of age. In the case of lack of acceptance, such a person starts to undertake various psychological mechanisms aiming at negation of the current situation; developmental crises also appear. Depressive symptoms are important signs of developmental crisis. It all has an important impact on these patients' attitude toward their treatment and their own illness [27].

An important strength of our study was that all the data were retrieved from high-quality Polish registers with almost 100% nationwide coverage. In addition, the number of patients included was large enough to guarantee reliable epidemiological estimates. The retrospective study design and the completeness of the follow-up of patients were other major strengths of this

study. Moreover, we adjusted for a confounding factors including age and sex. A strong point of the presented research was an analysis of 10-year long research. Nieto-Martínez et al., [8] stressed that the most important limitations of various studies about epidemiology of bulimia in diabetes are related to low sample size and short time of follow-up.

The presented epidemiological data were not devoid of limitations. One important limitation of the presented epidemiological data was considering only patients participating in state medical care. This factor might underestimate the actual picture of EDs in patients with T2DM. This is especially important in the context of a systematic review prepared by Ali et al. [28]. The systematic review found that in a group of patients, practical factors associated with accessing treatment including cost, transportation, and lack of time emerged as an important barrier towards help-seeking. The number of patients with EDs who participate in private medical care is not known. In Poland, the majority of patients with diabetes benefit from state medical care executed under public funding, because only within state medical care are patients entitled to partial medicine reimbursement, specialized medical examinations, and diabetics care without incurring additional fees. It should be noted that the treatment of diabetes and its complications is very expensive (e.g., hospitalizations, outpatient care, medications). Therefore, in the context of this disease in Poland, this group of patients enjoys the benefits of public funding rather than private funding. The problem is that with EDs, the number of patients with EDs who participate in private medical care is not known. Another important limitation was that our epidemiological data included only patients who sought medical help. We still do not know how many people with T2DM and EDs are undiagnosed. It should be noted that patients with EDs might be less likely to seek medical help than non-psychiatric patients. This is related to the disease etiology and symptoms of EDs. Therefore, carefully analysis of the prevalence of any psychiatric disorder based on NFZ data is justified. Many people with psychiatric disorder in Poland could be treated privately. For this reason, data might be incomplete, especially when it comes to the ED diagnosis. Other limitations of this study were the lack of information about some individual-level risk factors, such as dietary habits and anthropometric variables (e.g., body mass index, weight).

Thus, our epidemiological data from the period 2008–2017 indicated that the prevalence of EDs – anorexia and bulimia – in patients with T2DM was a relatively stable phenomenon, with a relatively downward trend. What is more, the incidence of EDs might affect each age group of patients with T2DM. However, special attention needs to be paid to patients aged 21–30, because prevalence of ED decreases with age.

Conclusions

A relatively stable trend in the prevalence of EDs in patient with T2DM participating in state medical care indicates the need to develop effective screening methods enabling early detection of EDs in patients with T2DM. Developing adequate procedures for therapy for this group of patients should include a multidisciplinary team of therapists consisting of a diabetologist, psychiatrist, psychotherapist, and dietician. Actions aimed at determining what percent of patients with EDs are

also diagnosed with T2DM who might benefit from private medical care also needs to be taken into consideration, as this information would provide more complete detailed epidemiological data pertaining to the coexistence of EDs and T2DM. It is also necessary to analyze the reasons why patients with EDs and T2DM might benefit from private medical care. This could improve the quality of state medical care (e.g., the quality of treatment, the effectiveness of diagnostics, and the doctor-patient relationship).

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