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Original Contribution

DEMOGRAPHIC DATA ANALYSIS IN CHILDREN WITH DIABETES MELLITUS REFERRED TO THE PAEDIATRIC ENDOCRINOLOGY OUTPATIENT UNIT IN STARA ZAGORA IN 1990-2020

R. Koleva*

First Diagnostic and Consultation Centre Stara Zagora, Bulgaria

ABSTRACT

Introduction: Type 1 diabetes mellitus (T1DM) is a disease with considerable variation in clinical presentation and progression. Epidemiological studies are the key to unravelling the still incompletely understood aetiology and pathogenesis.

Aim: To analyse demographic data (age, sex, place of residence, ethnos and age of T1DM onset) over a 30-year period.

Material and methods: A longitudinal study was performed of 184 children monitored in a children's endocrinology practice in the city of Stara Zagora in the period 1990-2020. The patients were divided in 3 groups during three time periods: 1990–2000 – 51 patients, 2001-2010 – 80 patients and 2011-2020 - 53 patients. The analysis is a descriptive representation of patient demographics during their first visit. The statistical processing was done using SPSS Statistics 26, one tailed t-test, one-way ANOVA, Chi-Square tests.

Results: For the three time periods, patients aged 10–18 were more prevalent, alongside the male gender (p=0.036). In the interval 2011-2020, there was a significantly higher difference in morbidity in patients from small towns and villages compared to large cities (p=0.001) and in the groups of Bulgarian ethnic groups (p>0.011) compared to other ethnic groups and previous years. In the three allocated intervals, the average age of onset of T1DM was 9.44, 9.86 and 8.67, respectively (p=0.316).

Conclusion: T1DM in childhood is a serious health, social and psychological problem. The dynamics of modern life require periodic skills improvement of medical specialists and dynamic adaptation of the legal framework concerning children's health.

Key words: diabetes mellitus, demographic data

INTRODUCTION

Diabetes mellitus is a complex of metabolic diseases characterised by chronic hyperglycemia from a deficiency in insulin secretion and/or insulin action that leads to disorders in carbohydrate, fat and protein metabolism. After obesity, type 1 diabetes mellitus (T1DM) is the second most common endocrine disease and the second most common chronic condition in childhood. T1DM is a heterogeneous disease with significant differences in clinical presentation and progression. Epidemiological studies are the key to elucidate its aetiology and pathogenesis that still remain incompletely understood. Since the early 1980s, the epidemiology of T1DM has been the subject of numerous studies on a global scale, with Bulgaria being one of the pioneers in this field. The first data on the incidence of diabetes in Bulgaria were reported in 1968 by T. Staykov, followed by data for the period 1973-1982. Since 1989, research teams in Sofia and Varna have participated as independent centres in two of the largest studies on the epidemiology of diabetes in childhood - EURODIAB and DIAMOND, with the active assistance of paediatricians working in Stara Zagora and interested in paediatric endocrinology (1).

THE AIM of the present study was to analyse some demographic factors (age, sex, place of residence, ethnicity, and average age at onset) in children with T1DM over a 30-year period.

MATERIAL AND METHODS

A longitudinal study was performed on 184 children monitored in a children's endocrinology practice in the city of Stara Zagora in the period 1990-2020. The patients

***Correspondence to:** *Reni Koleva, children endocrinologist, First Diagnostic and Consultation Centre Stara Zagora, 62 Ruski Street, Stara Zagora, Bulgaria, dearreni@abv.bg*

were divided in groups in three time intervals: 1990–2000 – 51 patients, 2001-2010 – 80 patients and 2011-2020 - 53 patients. The analysis is a descriptive representation of patient demographics during their first visit. The statistical processing was done using SPSS Statistics 26, one tailed t-test, one-way ANOVA, Chi-Square tests.

RESULTS AND DISCUSSION

Patients were grouped by age according to ISPAD Guidelines 2022 criteria (2): from 0 to 4 years and 11 months, from 5 to 9 years and 11 months and from 10 to 17 years and 11 months. Age- and sex-related distribution is presented on **Figure 1 and 2.**

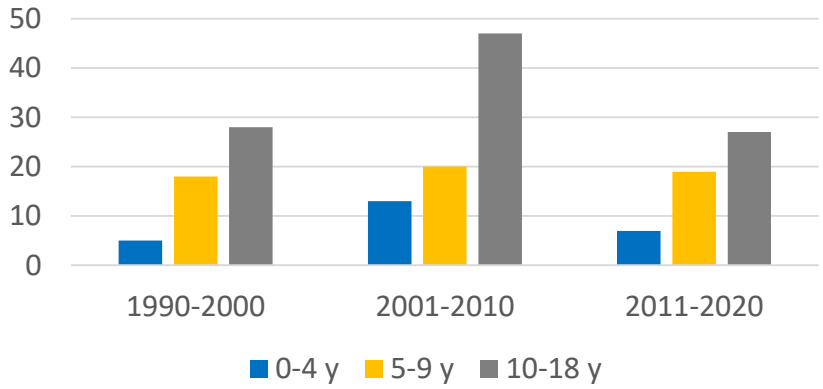

Figure 1. Distribution by age

The youngest patient in the cohort was 1 year 2 months old. Among all three periods, the largest number of patients was in the age group 10-18 years old, 55;59;51% respectively, similar to the epidemiological data in research literature (2, 3, 5).

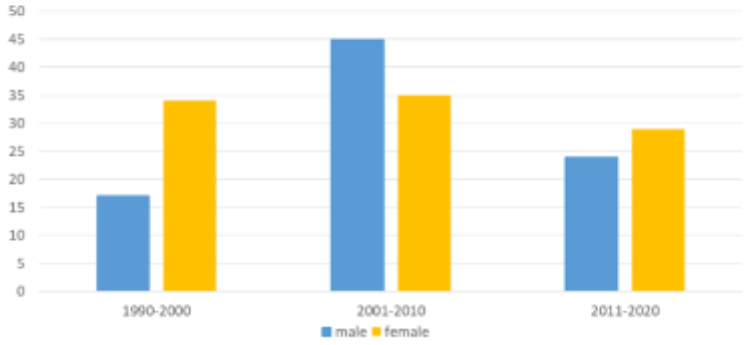

Figure 2. Distribution by sex

The ratio of patients in the three age groups (from 0 to 4 years and 11 months, from 5 to 9 years and 11 months and from 10 to 17 years and 11 months) was as follows: in 1990-2000 it was 1:3.6:28, in 2001-2010 - 1:1.5:3.6, in 2011-2020 - 1:2.7:3.8. According to Damyanova et al. (1) this ratio for the period 1973-1982 was 1: 1:3.4:2.09. Our data show a predominance of male subjects (p= 0.036). Distribution by age groups: along with the increasing incidence in the last 20 years, a "rejuvenation" of T1DM was observed in many countries, especially in preschool age (4, 5, 7) and in children 5-9 years of age (10). Our data did not show a significant increase in T1DM in the groups up to 9 years of age, as the largest number of children affected by T1DM were those at school age.

By sex, type 1 diabetes affected almost equally both sexes, it was observed more commonly in males which was more pronounced after 15 years of age (1, 2). In countries with low prevalence like Bulgaria, females were more frequently affected. A female predominance was also found in the Calabria region in a study from 2019-2022 (10). A possible reason for the predominance of the male gender in our study is that in the largest group 2001-2010, the number of men was higher.

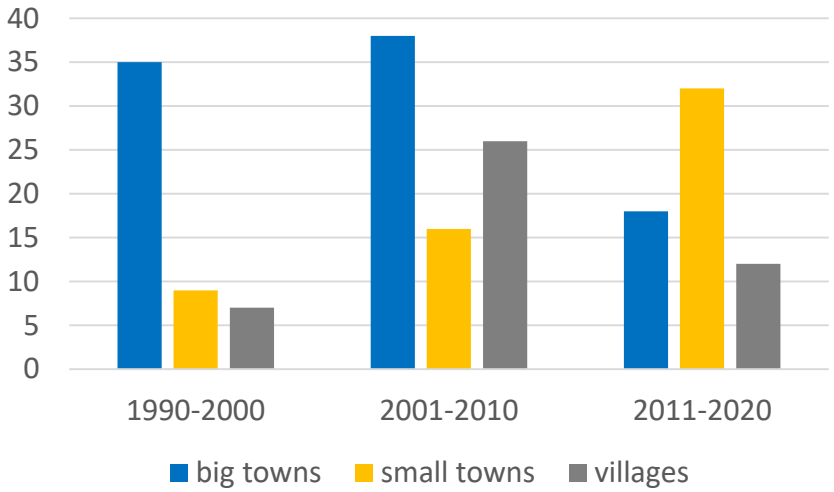

Figure 3. Distribution by place of residence

Figure 3 presents the distribution of patients by place of residence – a large city, a small town and a village. The statistical analysis showed a significant difference (P=0.001) in the 3rd group, with a higher incidence in small towns and villages.

Regarding the place of residence, studies on T1DM aetiology are focused on the interaction between genetic and exogenous factors – nutrition, exercise, stress, clean environment. In the 1st and 2nd groups (1990-2010), those living in large cities predominated. The demographic indicators of the country show depopulation of villages, a significant decrease in the population in small towns and its movement to large cities (11). However, those living with T1DM in the last group 2011-2020 have practically the same distribution by place of residence. The possible reasons for this are changes in people's lifestyles - seeking and consuming organic food, imposing a healthy lifestyle, changes in households and physical activity. The concentration of diabetes teams in university hospitals and the work of paediatric endocrinologists in large cities raises the question of the distance between families and the consultant. Modern technologies create real opportunities for distance communication, but unfortunately, they are not regulated during the working hours of medical specialists. The indicated consultations are not included in the national e-health system.

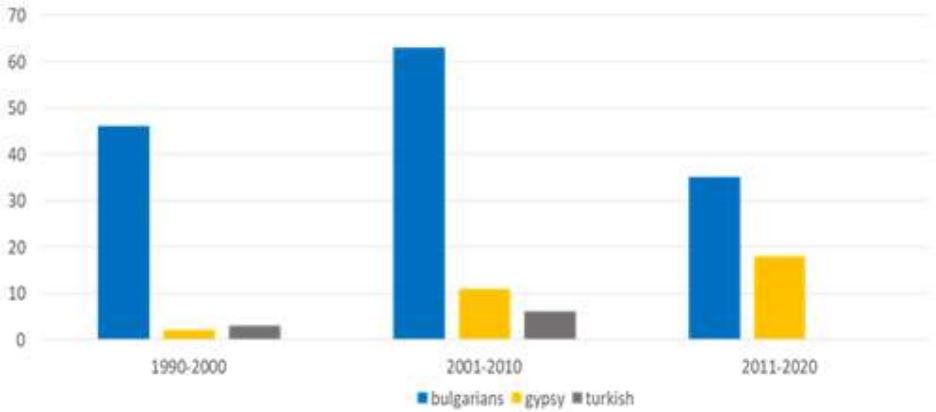

Figure 4. Distribution by ethnicity

Figure 4 presents the ethnic distribution in the groups. In our study, there was a significant difference between the Bulgarian and other ethnicities/non-Bulgarian groups (P < 0.011) in 2011-2020 compared to previous years. A possible reason for these data may be the changed birth rate in the different ethnic groups in Bulgaria.

In one of the largest studies on T1DM and ethnicity, SEARCH in the USA, a higher frequency of T1DM was found in children of African-American and Hispanic origin compared to those of other origins. Ethnic differences were also found in a study in New Zealand in diabetics aged 0-4 years, where the Caucasian race prevailed over the local population (6, 7). The changed “ethnic nuance”

of T1DM requires pediatric endocrinologists to have in-depth knowledge of the lifestyle, holidays, religions, family life and culture and is a serious step towards the challenge of the migration wave from different countries.

The average age of onset of T1DM: School age again presented the highest risk for diagnosis and the longest for treatment. This is a challenge for the systematic training for health workers, paedagogical and non-pedagogical staff in schools (8), motivation and emotional support from the school towards patients for the purpose of better control, motivating other students towards a healthy lifestyle and tolerance, a serious incentive for overcoming the stigma of diabetes mellitus and the "different" person (9). **Figure 5** presents an analysis of the average age of onset of diabetes. Over the three decades, the average age of T1DM onset was 9.4392 years; 9.8602 years; 8.6670 years, respectively without statistically significant difference (P = 0.316).

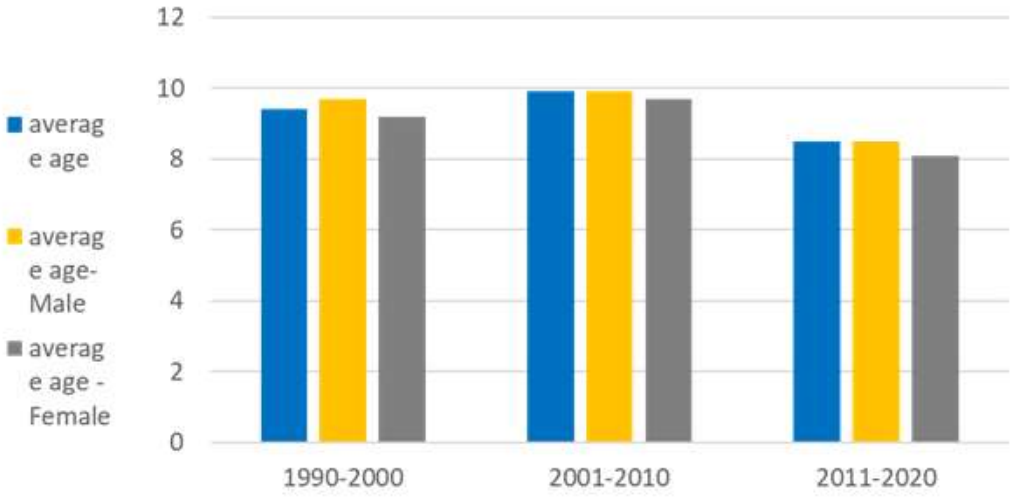

Figure 5. Average age of T1DM onset

CONCLUSION

Childhood diabetes is a serious familial health, social and psychological problem for families, health professionals and the entire society. The changing climate, the existing military conflicts and crises, the migration of the population, the level of education and the possibilities for nutrition require periodic reassessment of the medical specialists' skills and ongoing adaptation of the legal framework concerning the health of the juvenile population.

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