

REVIEW ARTICLE

No change in type 2 diabetes prevalence in children and adolescents over 10 years: Update of a population-based survey in South Germany

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Objective of this study was to analyze prevalence changes in type 2 diabetes (T2D) among children and adolescents over the last 10 years. We performed a cross-sectional survey in Baden-Württemberg (BW), Germany, by using a written questionnaire and comparing these results with T2D prevalence data from the same area retrieved in 2004/2005. In 2016, 50 patients with T2D under 20 years of age were registered in BW, Germany, which corresponds to a prevalence rate of 2.42 per 100 000 (95% confidence interval [CI]: 1.75-3.09). The prevalence rate found in the same geographic area 10 years prior was 2.30 per 100 000 (95% CI: 1.70-2.90). Overall, 70% of T2D patients of this age group were treated by adult diabetologists. Concisely the prevalence of T2D in children and adolescents is still low in South Germany, remaining practically unchanged over the past decade.

KEYWORDS

type 2 diabetes, prevalence, Germany, adolescents

1 | INTRODUCTION

Numerous reports documented a significant increase in type 2 diabetes (T2D) among adolescents at the beginning of the 21st century, particularly in North America and Asia. Based on rising incidence and prevalence figures, experts in the field predicted a dramatic epidemic of T2D in patients below 20 years of age. Lifestyle changes and altered food patterns among adolescents further fueled this prognosis.^{1,2}

Reports from European countries revealed considerably lower figures for T2D among young people³⁻⁶ compared to North America and Asia. To assess T2D prevalence among children and adolescents in Baden-Württemberg (BW), Germany, a statewide survey involving

pediatricians and adult physicians was conducted in 2004 to 2005. At present, more than 10 years later, this cross-sectional study was updated to determine whether there were substantial changes in T2D prevalence in patients under 20 years of age when comparing these two time periods.

2 | METHODS

BW is the third largest federal state and located in southwestern Germany. At the first survey, BW had a population of 10.7 million people. Of these, 2.4 million were between 0 and 20 years (22.7%). In 2016, at the current survey, the total number of inhabitants was

unchanged with 10.7 million, whereas the number of inhabitants under 20 years of age was lower with 2.0 million corresponding to 19.0% of all inhabitants. The recent population statistics was based on annual updates of the last national census in 2011.

In BW, a statewide network (DIARY = diabetes registry) was initiated in 1989 and designed to record type 1 diabetes incidence among children and adolescents. The registry is part of the EURO-DIAB and WHO Diamond networks. All the DIARY network institutions participated in the cross-sectional surveys conducted in 2004/2005 and 2016. Furthermore, all diabetologists working in private practice were contacted by their professional association (BVND: *Berufsverband niedergelassener Diabetologen*) and via the BW diabetological association (ADBW: *Arbeitsgemeinschaft Diabetologie in Baden-Württemberg*). They all received a written questionnaire and were asked of how many T2D patients under 20 years of age and living in BW they took care in 2016, with each institution contacted twice. The diabetes type was assigned by the healthcare providers from each institution, respectively.

3 | RESULTS

In 2016, 32 pediatric and 266 adult diabetes care institutions were contacted, with 32 (100%) and 114 (42.9%) of them completing the questionnaires, respectively. In total, 50 T2D patients below 20 years were registered, 15 of whom (30%) seen in pediatric care and 35 (70%) treated by adult diabetologists. The prevalence for the entire group thus was 2.42 per 100 000 (95% CI: 1.75-3.09).

Compared to type 2 diabetic patients from the 2004/2005 survey, total number and prevalence data recorded in 2016 were quite similar: In the first survey, 56 patients were identified, corresponding to a prevalence of 2.30 per 100 000 (95% CI: 1.70-2.90). Without any further trend analysis, the number of T2D patients has obviously remained unchanged over the last 10 years.

4 | DISCUSSION

The current study has followed a simple design, based on more than 25 years of epidemiological experience in BW, resulting in a very clear message: The prevalence of T2D among children and adolescents under 20 years old has not changed over the past 10 years, with a 2004/2005 prevalence of 2.30 per 100 000 (95% CI: 1.70-2.90) vs a 2016 prevalence of 2.42 per 100 000 (95% CI: 1.75-3.09).

Our initial survey already revealed that healthcare services for this age group were heterogeneous and provided by different specialists in diabetology. In 2004/2005, 50% of T2D patients less than 20 years were seen in pediatric care, while 50% were treated elsewhere. As a result, both pediatric and adult specialists were contacted for the 2016 survey. For the latter, 30% of the registered patients were in pediatric care and 70% in adult care, suggesting that the structure of medical care for this patient group remained heterogeneous and did not substantially change over time.

This survey has obvious limitations. While 100% of the pediatric institutions contacted completed the questionnaire, the response rate

among adult diabetologists was only 42.9% despite multiple reminders. We may speculate as to whether those who did not answer might have been in charge of adolescent T2D patients. This could explain the relatively low response rate. Furthermore compared with the 2005-2006 survey, in which 50% of the adolescents with T2D were seen in pediatric centers and 50% in adult centers, in 2016 30% of the registered patients were on pediatric care and 70% in adult care. These data, together with a reported lower response rate among adult diabetologists, seem to suggest that the two surveys are not completely comparable. In any case, the reported rate in 2016 should be considered as a lower limit for the prevalence of T2D in adolescents.

Completeness of T2D registries has been proven fragmentary and can thus not be compared with those pertaining to type 1 childhood diabetes with a habitual ascertainment rate of over 90%. Comparing prevalence figures in a well-defined area using identical means, however, can lead to robust trend data.

Most children and adolescents with T2D were part of specific ethnic groups, such as Afro-Americans, Hispanics, Asians, Pacific Islanders, and American Indians.⁷ This likely explains why T2D prevalence in Central Europe is significantly lower than in North America, as the number of descendants of these ethnic groups living in Europe proves noteworthy low. When comparing prevalence figures among different countries, a methodological problem arises: The reported age groups may differ considerably. For type 1 diabetes, registries tend to record children aged 0 to 14 years.^{8,9} Reports on T2D prevalence in childhood and adolescence, however, may refer to groups as follows: 0 to 14 years,¹⁰ 0 to 20 years,¹¹ 10 to 20 years,¹² or 6 to 15 years,¹³ thus rendering comparisons difficult. In spite of this, there is no doubt that the prevalence of T2D in South Germany remains far behind that of type 1 diabetes in the same area reported to be 132.6 (95% CI: 127.2-138.3) per 100 000 in patients 0 to 14 years.¹⁴

5 | CONCLUSION

Compared to North America and Asia, T2D in children and adolescents is still a rare condition in South Germany, its prevalence being considerably lower than that of type 1 diabetes in patients under 20 years of age. An increasing trend in T2D developing among children could thus not be detected by our survey update.

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