Prevalence and regional differences of gestational diabetes mellitus and oral glucose tolerance tests in Finland

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Introduction

During past two decades, the prevalence of gestational diabetes mellitus (GDM), defined as a type of diabetes diagnosed for the first time during pregnancy, has increased from 2–5% to 3–7%.¹⁻⁶ In Finland, prevalence of GDM was 0.5% in 1987 and 2.2% in 1988.⁷ According to a Finnish population-based study, the proportion of pregnant women with increased blood glucose levels was 15%.⁸

Decreased insulin sensitivity towards the end of pregnancy increases the risk of GDM.⁹ The other known risk factors are maternal overweight and high age, history of earlier GDM, macrosomic child or first degree relative with a history of type II diabetes.¹⁰⁻¹² Women with GDM have an increased risk of developing type II diabetes in their later life.¹³,¹⁴ Recent studies on GDM prevalence have reported regional variations¹¹ and associations with socio-economic characteristics of the women.¹⁵

The purpose of this study was to report the prevalence and regional differences of GDM, OGTTs and register-based GDM risk factors [age and body mass index (BMI)] among pregnant women in Finland.

Methods

Data for the study were based on the Finnish Medical Birth Register (MBR), which has recorded all births taking place in Finland since 1987. The register includes all live births and stillbirths of >22 weeks of gestation or weighing <500 g. The coverage of the register is complete: during the study period only 0.1% of all births were not reported to the MBR, but the MBR is routinely linked to the Central Population Register (data on live births) and to the Cause-of-Death Register (data on stillbirths and early neonatal deaths), after which it is considered to be complete. Data are checked in the MBR and seemingly incorrect information is sent back to the hospitals for correction. For most variables, the data correspond well or satisfactory to information found in hospital records. Since 2004, the register has included information on whether the oral glucose tolerance tests (OGTT) were performed, as well as maternal weight and height before pregnancy.

For this study, we utilized information on diagnostic criteria of GDM, results of OGTT and possible insulin treatment during pregnancy. These criteria are overlapping, not mutually exclusive. The diagnosis was based on the international ICD-10 classification. The data on numerical results of OGTT were unavailable from the medical birth register, only information on abnormal OGTT result during pregnancy was available. Total GDM prevalence was based on the information from different fulfilled criterions of GDM. Prevalence calculations do not include women with type I diabetes. Women with pregestational diabetes (type II) were not excluded, because they also could develop GDM. Differences in GDM prevalence between the geographical areas (Southern,
southwestern, central, eastern and northern) were analysed at the level of university hospital district.

Age- and BMI-standardized results were based on direct standardization using Finnish population as a reference. All statistical analyses were run using the SPSS v. 15.1 statistical package. The study was approved by the ethical committee of Tampere University Hospital District.

**Results**

In Finland, number of deliveries increased between 2004 and 2007 (table 1). The average age of women giving birth was 29.5 years (age range 14–52 years). Fifth (20%) of all women were overweight (BMI between 25 and 30 kg m⁻²) and 10% of the women were obese (BMI >30 kg m⁻²).

During the study period, the proportion of OGTTs increased from 22.2% to 27.5% (table 1). The age-standardized proportion of OGTTs increased as well (22.2–27.4%), but the age- and BMI-standardized proportions of OGTTs did not vary (27.1–27.7%). The proportion of abnormal OGTT results reduced from 9.6% to 8.3%. The proportion of OGTTs performed changed from 6.9% to 5.6% and use of insulin treatment during pregnancy varied between 1.6% and 2.1%. The prevalence of GDM changed from 11.2% to 10.5%.

Regional variation was also found in the proportion of women with BMI over 25 kg m⁻² (29.1–34.6%) and the proportion of women with age >40 years (3.3–4.0%) (table 2). In southern Finland, prevalence of GDM was low although the proportion of women with age >40 years was highest.

There was regional variation in proportion of OGTTs performed. It was highest in central (33.6%) and lowest in southern (19.0%) Finland (table 2). The age-standardization did not change regional variation in OGTTs, but the age- and BMI-standardized proportion of OGTTs was smallest in northern Finland instead of southern. Also the prevalence of GDM was highest in central (14.7%) and lowest in southern (7.9%) Finland. The age- and BMI-standardized proportion of OGTT was smallest in northern Finland reflecting differences in age structures of the regions.

**Discussion**

The study from other countries showed increasing prevalence of GDM.,\(^1\)\(^–\)\(^3\) According to our register-based results, prevalence of GDM in Finland varied between 10.3% and 11.2% in 2004–06 and the proportion of oral glucose tolerance tests increased from 22% to 28%. At the end of the 1980s, prevalence of GDM was only 0.5–2.2% collected in a clinical sample from Kuopio and Helsinki.\(^7\) Since there are differences in diagnostic criteria of GDM, especially in oral glucose tolerance test thresholds,\(^1\)\(^–\)\(^6\) part of the variation in GDM prevalence may be due to variability in diagnosis criteria. It is difficult to evaluate how large proportion of GDM variation could be due to differences of GDM diagnosis, but our estimation is that even 2-fold variation can be found. Finnish national guidelines for GDM diagnosis were published only in 2008.\(^16\) Our results describe the prevalence of GDM before these guidelines were published.

Our study supports the previous findings that prevalences of both GDM and OGTT differ by region.\(^11\) The region with a large proportion of women undergoing OGTTs also had a high prevalence of GDM. The proportion of Finnish pregnant women undergoing OGTT was nearly a third, showing a higher compliance to screening than reported in other countries, especially in Sweden.\(^17\) The proportion of abnormal OGTTs should be considered as an important predictor of GDM. Overweight and age >40 years explained only a fourth of the regional variation in GDM prevalence in Finland.

In Finland, the prevalence of GDM is higher than in the other European countries.\(^1\)\(^–\)\(^4\) Our results showed high annual proportions of oral glucose tolerance test, which may be due to frequent GDM screening during pregnancy.\(^3\) Another strength of our study is that our results are based on Medical Birth Registry with practically complete coverage of deliveries, a more reliable data than non-registry data sources.\(^18\)

Gestational diabetes is an important public health issue, because women with a history of GDM and their offspring both have a higher risk of type II diabetes.\(^14\) Treatment of GDM with insulin and lifestyle modifications decreases adverse outcomes of the pregnancy.\(^19\) Prevention of GDM and excessive weight gain during pregnancy with lifestyle modifications\(^20\) are increasingly important in the future since due to the high and increasing prevalence GDM all over the world.

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Conflicts of interest: None declared.

Key points

- Increasing prevalence of GDM is an important public health issue because women with history of GDM and their offspring have a high risk of type II diabetes.
- Prevalence of GDM and OGTTs varied between geographical regions in Finland.
- Regional variations in GDM prevalence were higher than variation by risk factors (overweight and age over 40 years), which explained only fourth of the regional variation.

References


Mortality from diabetic renal disease: a hidden epidemic

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Background: Population-level mortality indicators can be useful outcome measures of diabetes care. Death registration systems serve as the main source of data for such measures. However, standard mortality indicators based on underlying causes do not adequately reflect the burden from diabetic renal disease. Methods: This article presents findings from analysis of multiple causes of death available from death registration data for Australia and USA. Both countries use an automated system that applies prescribed rules to select and code the underlying cause for each registered death. Deaths with diabetes as underlying cause were grouped according to their diabetic complications as defined by the International Classification of Diseases. Age-standardized mortality rates were calculated for the underlying cause ‘diabetes with renal complications’. These were contrasted with rates calculated using additional deaths where diabetes was the underlying cause and renal failure was listed as a consequence. Results: These analyses identified that current automated programmes code three-fourths of all diabetes deaths to ‘diabetes without complications’, despite additional factors being listed. Estimated multiple cause death rates from diabetic renal disease are four to nine times higher than underlying cause rates for ‘diabetes with renal complications’ in both countries; and show a rising trend in contrast to the latter. Conclusion: These findings indicate that routine underlying cause statistics for USA and Australia grossly under estimate mortality from diabetic renal disease. Clear guidelines on the certification, coding and statistical presentation of diabetes mortality are needed for epidemiology and health policy.