



**Karolinska
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The risk of type 1 diabetes in immigrants and their offspring in Sweden: the influence of perinatal factors

AKADEMISK AVHANDLING

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Av

Hozan Ismael Hussen

M.D.

Huvudhandledare:

Docent Tahereh Moradi
Karolinska Institutet
Institutet för miljömedicin
Enheten för kardiovaskular epidemiologi

Bihandledare:

Martina Persson, MD, PhD
Karolinska Institutet
Institutionen för medicin
Enheten för klinisk epidemiologi

Fakultetsopponent:

Professor Elisabete Weiderpass Vainio
Karolinska Institutet
Institutionen för medicinsk epidemiologi
och biostatistik

Betygsnämnd:

Professor Claes-Göran Östenson
Karolinska Institutet
Institutionen för molekylär medicin och kirurgi

Docent Anna Färnert
Karolinska Institutet
Institutionen för medicin

Professor Ragnar Westerling
Uppsala universitet
Institutionen för folkhälso och
vårdvetenskap, Socialmedicin

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ABSTRACT

Aims: The overall aim of this study was to investigate the trend in and risk factors for type 1 diabetes, with particular reference to parental socioeconomic position (SEP) and country of birth of subjects and their parents. We examined the effects of maternal body mass index (BMI), maternal duration of residence and parental diabetes on the risk of type 1 diabetes among children and adolescents/young adults with native Sweden-born or immigrant parents.

Materials and methods: We used data from a nationwide dataset, The Migration and Health Cohort, in which information has been collected from national, longitudinal and clinical, health and sociodemographic registers (Studies I–IV). We followed the populations of children (0–14 years) and adolescents/young adults (15–30 years) born outside Sweden (immigrants), born in Sweden with at least one parent born outside Sweden (offspring of immigrants) and born in Sweden with both parents born in Sweden between 1969 and 2009. Incidence rate ratios with 95% confidence intervals for type 1 diabetes were estimated using Poisson regression models (Studies I–IV). We further calculated age-standardized rates of type 1 diabetes, using the world population as standard (Studies I and II).

Results: We observed an upward trend in type 1 diabetes incidence among children younger than 15 years of age, but not among adolescents/young adults aged 15 to 30 years (Studies I and II). We also observed a shift towards a younger age at diagnosis both in offspring born to native Swedes and those born to immigrants (Study II). Boys younger than 15 years with parents with a low level of education as an indicator for a low level of SEP had a 9% decreased risk of type 1 diabetes compared with boys with highly educated parents, whereas no effect of parental education was found among girls. By contrast, among adolescents/young adults aged 15–30 years, the risk of type 1 diabetes decreased with increasing parental level of education (Study I). Compared with children of Sweden-born parents, immigrants and their offspring had a lower risk of type 1 diabetes. The lower risk was more pronounced among offspring with both parents born abroad (Studies I and II). Among children and young adult immigrants born in Asia, South Europe, East Europe and Latin America, the risk of type 1 diabetes was between 40% and 85% lower than in individuals born in Sweden (Study I). Among offspring of Asian, European (except North European) and Latin and North American parents, the risk of type 1 diabetes was between 35% and 65% lower than among offspring of Sweden-born parents, whereas the risk was 45–60% higher in offspring of East African parents (Study II). In comparison to offspring of non-diabetic parents, a seven-fold increased risk of type 1 diabetes was observed in offspring of both Nordic and non-Nordic parents with type 1 diabetes (Study III). In the Nordic cohort, fathers with type 1 diabetes conferred a greater risk of type 1 diabetes to their offspring than mothers, whereas maternal type 1 diabetes conveyed a higher risk in the non-Nordic cohort (Study III). Maternal obesity was associated with a 36% increased risk of type 1 diabetes in offspring of non-diabetic parents (Study III). The risk of type 1 diabetes increased with increasing duration of residence of the mother before delivery. The highest risk was observed in offspring of East African mothers who had been resident in Sweden for at least 11 years (Study IV).

Conclusions: Country of birth is an important determinant of type 1 diabetes risk. The change in risks of type 1 diabetes over time and generations highlights the importance of lifestyle and environmental factors and their interaction with the genetic background in the aetiology of type 1 diabetes. Increasing prevalence of maternal overweight and obesity may partly explain the increasing incidence of type 1 diabetes in children of non-diabetic parents.