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Diabetes among migrants in Denmark: Incidence, mortality, and prevalence based on a longitudinal register study of the entire Danish population

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ABSTRACT

Objective: Studies of diabetes in migrant populations have shown a higher prevalence compared to their respective countries of origin and to people natively born in the host country, but there is little population-based data on diabetes incidence and mortality in migrant populations. The aim of the current study was (1) to describe the incidence rates and prevalence of diabetes among first generation migrants in Denmark compared to the Danish background population, and (2) to compare standardised mortality rates (SMRs) for individuals with and without diabetes according to country of origin.

Research design and methods: Information was obtained from linkage of the National Diabetes Register with mortality statistics and information from the Central Personal Register on country of origin. Age- and sex-specific estimates of prevalence, incidence rates, mortality rates and SMRs relative to the part of the population without diabetes were calculated based on follow up of the entire Danish population.

Results: Compared with native born Danes, the incidence of diabetes was about 2.5 times higher among migrants from Africa, Asia, and the Middle East, and these migrant groups also showed significantly higher prevalence. The standardised mortality rates (SMR) were higher particularly above 50 years of age among most migrant groups compared with native born Danes, and with a higher annual increase.

Conclusions: The highest diabetes incidence rates and prevalence estimates were observed among migrants from Africa, Asia, and the Middle East, and the annual increase in SMRs was higher in these groups compared to native born Danes.

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1. Introduction

With the worldwide rise in both diabetes and global mobility throughout the past decades, the consequences of ethnicity, international migration and national rural-urban migration on the development and progression of diabetes have gained more attention. Studies of diabetes in migrant populations have generally shown a higher prevalence compared to the respective countries of origin and compared to the population natively born in the host country [1–5]. In many populations, there is a marked effect of migration to more industrialized societies indicating a role of environmental factors most likely in combination with a high underlying genetic risk of diabetes. Existing studies have in particular shown high rates of diabetes prevalence among migrants from Asia and the Middle East compared to Western populations.

The current evidence on diabetes morbidity in migrant populations is mainly based on cross-sectional or smaller longitudinal studies, and is therefore primarily reporting prevalence estimates or are prone to selection bias due to non-response among ethnic minorities in observational studies [6]. Mortality among migrants with Diabetes has been investigated in few studies and generally reported higher diabetes mortality in migrant populations in Europe compared with the population natively born in the host country [7–10]. However, in order to understand whether differences in diabetes prevalence between migrant populations and native borns are caused by higher incidence, lower mortality, or both, studies of differences in diabetes incidence are needed.

Based on existing national registers in Denmark, individually linked and largely un-biased information is available on diabetes incidence and mortality. This provides a unique opportunity to investigate incidence and mortality patterns among migrant populations and native born Danes. We therefore: (1) examined the incidence rates and prevalence of diabetes among migrants in Denmark compared to native born Danes, and (2) compared standardised mortality rates (SMRs) for individuals with and without diabetes according to migration status.

2. Materials and methods

2.1. Data sources

Data for the present analyses were obtained through linkage of national individual-level register data from the Danish Civil Registration System and the National Diabetes Register (NDR) in addition to population-level data on the entire Danish population from Statistics Denmark.

2.2. Birth, death and region of origin

All persons with permanent residence in Denmark have a unique personal identification number recorded in the Danish Civil Registration System where information on dates of birth, death, immigration and emigration is available. Migrants living in Denmark were identified in the system according to the definition by Statistics Denmark [11] as persons born outside Denmark but presently living in Denmark. There is no distinction made whether people entered Denmark as immigrants or refugees. Country of origin was then classified into region of origin groups according to WHO regions classification as (1) Denmark, (2) Europe, (3) Sub Saharan Africa, (4) Middle East and Mediterranean, (5) Asia and (6) America + Oceania.

2.3. Diabetes prevalence and incidence rates

Identification and date of diagnosed diabetes was obtained through NDR, which was established in 2006 by linking information from three registers: The National Patient Register, The nationwide National Health Insurance Service Registry with nationwide coverage and The Register of Medicinal Product Statistics [12]. NDR contains records of about 437,000 persons with diagnosed diabetes; 306,000 were alive on 31. December 2009, corresponding to an overall prevalence of 5.1%. Maintenance of the NDR was discontinued by the end of 2012, and information on the date of death is approximately two years delayed in relation to NDR. Therefore, at the time of data acquisition we were unable to obtain information on date of death later than December 31, 2009. For that reason people included in the present study were censored no later than December 31, 2009. While the register is based on administrative records, the date of inclusion can only be taken as a proxy for the date of diagnosis, and a formal clinical diagnosis will probably have been made some time before date of inclusion in the register. Because of the different dates of initiation of the underlying registers and accumulation of prevalent cases, we only considered date of inclusion reliable as of 1 January 1995, even though inclusion of cases started at 1 January 1990. Therefore, incidence analyses are restricted to patients included after 1995. The NDR does not distinguish between type 1 and type 2 diabetes, and analyses were performed for all diagnosed diabetes. People with undetected diabetes are not likely to be included in NDR.

2.4. Construction of the database

Follow-up information was available on persons with diabetes and from immigrants, whereas person-years and deaths by sex, age and calendar time (1-year classes) for the rest of the Danish population was obtained from Statistics Denmark. Diabetes events, deaths and person years subdivided by diabetes status were tabulated by ethnicity, sex, age, and calendar time (1-year classes). Then, by subtraction we obtained the person-years and deaths in the non-immigrant non-diabetes part of the population. The resulting database thus encompasses diabetes diagnoses, deaths and person-years for the entire Danish population subdivided by diabetes status, ethnicity, sex, age and calendar time in 1-year classes.

In order to model mortality in people with diabetes and in the entire population, we also compiled the number of diabetes patients alive at 1 January each year in 1-year age-classes, subdivided by sex and ethnicity.

2.5. Statistical analysis

Prevalence of diabetes was modelled separately for each date, sex and ethnic group using a binomial model with log-link