**SHORT REPORT**

**Diabetes mellitus in Turkish immigrants in Sweden**

PE Wändell, K Hjörleifsdottir Steiner, SE Johansson

**SUMMARY**

This study analyses the risk of self-reported diabetes mellitus among Turkish-born immigrants in Sweden. Two simple random samples were used: The Swedish National Board of Health and Welfare Immigrant Survey, and the Swedish Survey of Living Conditions, both from 1996. Totally 526 Turkish immigrants, 285 men and 241 women, were compared with 2,854 Swedish controls, 1,425 men and 1,429 women, all in ages 27-60 years. Data were analysed by sex in an age-adjusted model, and a full model also included education, employment status, BMI and country of birth (logistic regression). Among Turkish men, age-adjusted diabetes prevalence was not higher than among Swedish men, odds ratio (OR) 1.04 (95% confidence interval (CI) 0.35-3.11).

Among Turkish women, age-adjusted diabetes prevalence was higher than among Swedish women, OR 3.22 (95% CI 1.36-7.64), but when also adjusting for educational level, employment status and BMI, OR was 1.22 (95% CI 0.41-3.66). We conclude, that age-adjusted presence of known diabetes was higher among Turkish-born women than among Swedish women, but was explained by lower employment rate, lower educational status and a higher level of overweight and obesity.

**Key-words:** Diabetes Mellitus · Migrants · Socio-economic Status · Sweden · Turks.

**RéSUMÉ**

Cette étude analyse le risque de diabète auto-déclaré chez des immigrants nés en Turquie vivant en Suède. Deux échantillons aléatoires simples ont été utilisés: la Swedish National Board of Health and Welfare Immigrant Survey, et la Swedish Survey of Living Conditions, toutes deux datant de 1996. Au total, 526 immigrants turcs, 285 hommes et 241 femmes, ont été comparées à 2 854 témoins suédois, 1 425 hommes et 1 429 femmes, tous âgés de 27 à 60 ans. Les données ont été analysées par sexe dans un modèle ajusté sur l’âge, et dans un modèle complet incluant aussi l’éducation, le statut vis-à-vis de l’emploi, le BMI et le pays de naissance (régression logistique). Parmi les hommes turcs, la prévalence du diabète ajustée sur l’âge n’était pas plus élevée que chez les hommes suédois, odds ratio (OR) 1.04 (intervalle de confiance 95 % (CI) 0.35-3.11). Parmi les femmes turques, la prévalence du diabète ajustée sur l’âge était plus élevée que chez les femmes suédoises, OR 3.22 (95 % CI 1.36-7.64), mais lorsqu’on a aussi ajusté pour le niveau éducatif, l’emploi et le BMI, OR était alors de 1.22 (95 % CI 0.41-3.66). En conclusion, la présence d’un diabète connu, ajustée sur l’âge, est plus élevée chez les femmes nées en Turquie que chez les suédoises, mais cela est expliqué par un plus faible taux d’emploi, un statut éducatif plus bas et un plus fort niveau de surpoids et d’obésité.

**Mots-clés :** Diabète sucré · Migrants · Statut socio-économique · Suédois · Turcs.

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Diabetes mellitus is a disease with worldwide spreading, with an estimated prevalence of 4.0% in 1995 in adults ≥ 20 years of age, with an expected increase to 5.4% by 2025 [1]. The frequency differs between different populations, from 1.1% in Sub-Saharan Africa to 24.0% in Nauru. In Sweden, the prevalence of known diabetes has been estimated to 3.2% [2].

The immigration in Sweden has increased during the last decades, with the frequency of foreign-born being 11.5% of the Swedish population, compared to 7.5% in 1980 and 6.7% in 1970 [3]. The prevalence of diabetes in immigrants in Sweden is unknown. It may be higher compared to Swedish-born subjects, especially of type 2 diabetes, for different reasons. The adopting of a “Westernised”, diabetogenic lifestyle may reveal a genetic susceptibility for especially type 2-diabetes in some ethnic groups, e.g., in Asian immigrants in Great Britain, with obesity as one of the main factors [4].

The migrant situation also implies possible problems. The psychosocial stress in the migrant situation could be a possible diabetogenic factor, and other factors complicating the care of diabetic patients could be problems with adaptation to the new home country, owing to differences in culture, religion and language, or due to low education, i.e., the illiteracy is high in some groups.

No specific study has been performed regarding diabetes in Turkish immigrants in Sweden. Diabetes prevalence in Turkey has been estimated to 7.2% in adults ≥ 20 years of age, and when adjusting by age to the whole European population to 8.9% [5]. In a study of coronary heart disease among Turks in Germany, the prevalence of diabetes among adults aged 35-64 years of age was estimated to 7.8% among men and 9.9% among women [6].

Our aim was to study whether the prevalence of diabetes in Turkish immigrants in Sweden is greater than in Swedish-born subjects, and if so, whether this could be explained by differences in socio-economic status.

Materials and methods

This study is based on data from Swedish Survey of Living Conditions (1996) and the first Swedish national survey of immigrants, including migrants born in Iran, Chile, Turkey, and Poland. The immigrant survey was conducted as a joint project by the National Board of Health and Welfare, the Swedish Immigration Board, the National Institute of Public Health, and the Swedish Government. The questionnaire used was the same as the Swedish Survey of Living Conditions, on-going in Sweden since 1975, but was supplemented by immigrant-specific questions.

A simple random national sample of migrants born in Turkey in the ages 27-60 was drawn from the Swedish population register. Subjects who did not belong to the population studied were excluded, i.e., migrants who had lived in Sweden before 1980, had lived abroad for many years, or had died. The remaining sample consists of 802 individuals. The response rate was about 66%, resulting in 285 male and 241 female immigrants or refugees born in Turkey, including Kurds. In the diabetes prevalence study in Turkey by Satman et al. Kurds were also included [5]. Data were collected in face-to-face interviews by trained interviewers from Statistics Sweden, from September 1996 to January 1997. The participants were presented with questions and response alternatives in Turkish. They were compared with a sample of native Swedes (n = 2,854) of the same age, interviewed during 1996 as a part of the annual Swedish Survey of Living Conditions.

Analysis of non-respondents

The non-response rate was 34.4% for Turks. About half of all non-respondents refused to participate, and the other half could not be located. A possible reason for the high proportion of missing persons might be that many of the migrants had been repatriated, but had not informed the Swedish authorities (i.e., the population registry) of their departure. The age distribution among respondents and non-respondents was about the same. Non-respondents were also more prevalent in large cities such as Stockholm and Gothenburg, and had lower income than respondents. Owing to such non-response, it is probable that un-health in the population has been underestimated to some extent. However, relative risks are probably less influenced by non-response than absolute measures such as prevalence.

Outcome variables

Diabetes mellitus was defined as self-reported presence of this disease on a specific question, i.e., “Do you suffer from diabetes?”. Cardiac disease and hypertension were also self-reported.

Explanatory variables

Age at the time of interview was classified according to the following groups: 27-39, 40-49, and 50-60 years of age. Marital status was dichotomised as single or cohabiting. Working status was dichotomised as not working or working. Smoking habits: The reference category was “Never smokers” and the other categories were “Former smokers” and “Daily smokers”. Body Mass Index (BMI) based on self-reported weight and height, was calculated as weight/height2 (kg/m2) and called BMI-units. The following categories were used, according to the WHO classification: normal < 25 BMI-units, overweight 25-30 BMI-units, and obesity > 30 BMI-units. Physical activity comprised five categories of leisure physical activity, but was in the analysis dichotomised into: being physically inactive or occasionally active vs. regular physical activity at least once a week.

The reliability of the dependent and independent variables was analysed in 1989 in re-interviews (test-retest...
method), yielding kappa coefficients between 0.7 and 0.9, thus indicating a high level of reliability.

**Statistical analysis**

Data was analysed using logistic regression. The results were shown as odds ratios (OR) with a 95% confidence interval (95% CI). Two main models were used, the first with adjustment for age, and the second with adjustment also for educational level, employment status, and BMI level. The fit of the models was judged by residual analysis.

**Results**

The distribution of socio-demographic and some medical variables is demonstrated in Table I, with crude data shown. Among Turkish-born men, educational level and rate of employment was lower, smoking and physical activity more frequent, and hypertension less frequent, when compared to Swedish-born men. Among Turkish-born women, educational level was much lower, rate of employment lower, and overweight and obesity as well as physical inactivity more common, and hypertension less common.

In Table II, the prevalence of self-reported diabetes by different variables is shown. Presence of diabetes increases by age, decreases by educational level and employment, and increases by BMI level.

Among Turkish men, age-adjusted diabetes prevalence was not higher than among Swedish men according to logistic regression, OR 1.04 (95% CI 0.35-3.11). When also adjusting for education, employment status and BMI-level, the OR was 0.89 (95% CI 0.28-2.85). Among Turkish women, age-adjusted diabetes prevalence was higher than among Swedish women, OR 3.22 (95% CI 1.36-7.64), but when also adjusting for educational level, employment status and BMI, OR was 1.22 (95% CI 0.41-3.66).

**Discussion**

This is the first study to show a higher relative risk for diabetes among foreign-born Turkish women compared to Swedish women. However, this increased risk was explained by lower socio-economic status, lower employment status and increased BMI.

This study has its limitations. The responding rate was rather low in the Turkish-born sample, which could underestimate the rate of un-health. Data are self-reported, and not confirmed with laboratory tests. However, the Swedish Survey of Living Conditions has been performed in Sweden since 1975, and tests of validity and reliability have shown

<table>
<thead>
<tr>
<th>Variable</th>
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Table II
Prevalence (per cent) of self-reported diabetes in the ages 27-60 years from the Swedish Survey of Living Conditions from Statistics Sweden.

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Women Diabetes</th>
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<td>0.8</td>
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<tr>
<td>40-49</td>
<td>1.7</td>
<td>2.2</td>
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</tr>
<tr>
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<td>3.8</td>
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<td>Education, years</td>
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<tr>
<td>0-9</td>
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<tr>
<td>10-12</td>
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<td>1.1</td>
<td>0.9</td>
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</table>

The accuracy of self-reported hypertension has been found to be low in other studies, e.g., the study from Taiwan [9], but also another Swedish study [11]. The lower figure regarding hypertension among Turkish subjects may be surprising, but is in accordance with the results from a study of cardiovascular risk factors among immigrants in Sweden [12].

As mentioned earlier, the prevalence of diabetes in Turkey is estimated 8.9% when standardised to the population in the whole of Europe [5]. In that study, the prevalence was somewhat higher among women than men, with crude rates of 8.0% vs 6.2%. The rate of obesity among women was 29%, with an additional of 27% being overweight, compared to 16% and 35%, respectively, in our study. However, the figures in the Turkish study were results of measurements, while in our study of self-reported values.

Satman et al. in their study in Turkey suggested, that the higher rates of obesity and glucose intolerance among women could be explained by lack of employment outside the home, and by the limitation of physical activity only to home-work [5]. This hypothesis seems to be confirmed by the results in our study, especially regarding non-employment.

The association between low socio-economic status and diabetes is reported earlier [13], and it has also been reported that an adverse socio-economic position among immigrants from Turkey partly explains their poor health [14]. Our findings are in line with this.

Our findings, with the higher diabetes prevalence among Turkish women in Sweden, put demands not only on the health care system, but also on the whole society, as the analyses suggest that the main reason for these high figures is a lack of acculturation. Barriers to this are language problems, and the low educational level among these women. Special efforts must be performed on different levels to meet these demands.

References


