ARE THERE ASSOCIATIONS BETWEEN SOCIO-ECONOMIC STATUS AND KNOWN DIABETES IN AN ELDERLY FINNISH POPULATION?

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SUMMARY

The aim of the study was to describe the associations between socio-economic status and type 2 diabetes in a non-institutionalised population aged 70 years or over. Diabetes was assessed on the basis of self-reports and additionally 2-h oral glucose tolerance test for the subjects on diet treatment. Socio-economic status was assessed by questions on marital status, number of residents in household, basic education, self-rated income and economic status. In the population of 379 subjects (141 men), 14% (n = 19) of men and 19% (n = 46) of women had known diabetes. Known diabetes was less common among married compared to unmarried, widowed or divorced subjects. Diabetes was also more common among men with higher compared to lower level of basic education, while a reverse trend was seen among women. Women, who had been engaged in manual labour, had diabetes more often compared to those engaged in administrative work. Diabetes was more common among men who rated their income as good, but the opposite was true of women. Higher income among men and lower income among women were the most powerful variables associated with known diabetes. Known diabetes was more common in elderly women with lower socio-economic status, whereas the opposite was true of men. This finding suggests that the impact of the socio-economic changes that have taken place in Finland in the 20th century on the risk factors for diabetes has been greater among men with higher and women with lower socio-economic status.

Key words: elderly, type 2 diabetes, prevalence, risk factors, socio-economic factors

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INTRODUCTION

The studies on the associations between socio-economic status and diabetes suggest that, in developing countries, diabetes is more common among the higher social classes, whereas in western and other industrial countries, more people in the lower social classes suffer from diabetes (1–4). The effect of transition from a traditional way of living to a westernized lifestyle, including the inherent social and economic changes, has been shown to be associated with an increased prevalence of diabetes (5–8).

The results of the effect of education are controversial and vary depending upon age, gender, ethnic and racial factors, place of residence as well as the overall level of development of the country (6–10). In an earlier study in the 1980's, the prevalence of risk factors, including diabetes, for cardiovascular disease tended to be higher among Canadian men and women with a low level of education, as it was also in a recent study among Puerto Rican adults in New York. (9, 10). As to gender differences related to education, the results are somewhat controversial. In the USA, among multiracial men and women aged 40 to 74 years, after adjustment for age and ethnicity, women with higher education had a lower prevalence of non-insulin-dependent diabetes, while no association was seen in men between a higher level of education and diabetes (11). In the 1970's, on the other hand, Medalie and co-workers found that a low level of education was an important variable associated with the incidence of diabetes among Asian, African and Israeli-born men experiencing rapid environmental changes (12), and recently, Gikas and co-workers found an association between diabetes and low level of education among Greek women, but not among men (5). In a recent Swedish study, Wandell and co-workers also concluded that type 2 diabetes is associated with lower socio-economic status and male sex (8).

The results produced by studies concerning the associations between diabetes and marital status are also varying and even controversial. For example, in a study among middle-aged Swedish men, diabetes was not associated with marital status (13), whereas in another Swedish study, type 1 diabetic patients aged 20–54 years were unmarried and lived alone more often than the controls (14).

Data are very scarce on the associations between socio-economic status and type 2 diabetes in elderly Finnish people, who have experienced major changes their lives, such as wars and shortage of food, affecting their socio-economic status.

Aim of the Study

The aim of this study was to describe the associations between socio-economic status and known diabetes in an elderly Finnish non-institutionalized population.

SUBJECTS AND METHODS

The study population consisted of all non-institutionalised persons born in 1920 or earlier and resident in the municipalities of Kempele, Oulunsalo and Hailuoto in northern Finland on 1 September 1991. The study was conducted between 1 September 1991 and 29 February 1992 in two phases. The first phase consisted of a postal questionnaire, including questions about the participants' known diabetes. In the second phase, the diabetic participants on a prescribed diet underwent an oral glucose tolerance test (OGTT) to verify the diagnosis of type 2 diabetes. A person was then classified as having known diabetes if he/she was on oral drug or insulin treatment or if he/she was on a prescribed diet and additionally had an OGTT 2-hour value 11.1 mmol/l (15). The population of this study consisted of all community-living elders aged 70 years or over in three comparatively small municipalities (total population 17,800) near Oulu, the largest town in northern Finland. Of the 483 eligible persons, 78.5% (n = 379) took part in the study. A detailed description of the study population and the methods used has been presented previously (16).

Socio-economic status was derived from the following variables included in the postal questionnaire: marital status, number of residents in household, basic education, previous occupation, self-rated income and economic status. Each of the socio-economic variables included 3 to 7 reply alternatives, which were categorised into two or three classes in the analysis of the results. Number of residents in household was defined as living alone or living with a family member or some other person. Education was determined with a question including three alternatives: less than basic education, basic education and more than basic education. Previous occupation was finally classified as follows: manual labour, administrative labour. Self-rated income was assessed by the following question: How do you get along with your present income? Self-rated economic status was asked as follows: What is your present economic status, taking into account the property you own? The reply alternatives for the two questions were: 1 = very well, 2 = fairly well, 3 = average, 4 = fairly poorly, 5 = very poorly. A sum score of educational level, income and economic status was also formed.

Statistical Methods

Percentages and cross-tabulations were used to analyse the results. The associations between diabetes and socio-economic status were tested by χ^2-test or by Fisher's exact 2-tailed test. The level of statistical significance was set at $p \leq 0.05$. A logistic regression model (OR, 95% confidence intervals) with known diabetes as the dependent variable and marital status, basic education, previous occupation, self-rated income and age as the explanatory variables, was performed separately for the sexes, because the associations between the variables used in the model were different for the genders in bivariate analyses.

RESULTS

Background Data

The OGTT-corrected prevalence figure for known type 2 diabetes were 14% (n = 19) for men and 19% (n = 46) for women. The nondiabetic group consisted of 110 men and 171 women. A detailed description of the study population has been given elsewhere (15).

37% (N = 141) of the participants were men and 63% (238) were women. The mean age of the participating men was 75.7 (SD 4.9) years (range 70–92 yr.) and that of women was 76.8 (SD 5.0) years (range 70–92 yr.). 71% of men and 26% of women were married, 6% of men and 8% of women were unmarried, 22% of men and 64% of women were widowed and 1.5% of men and 2% of women were divorced.

Overall, the majority of the participants had completed basic compulsory education; the proportion of men with a lower educational level was 16%, while the corresponding figure for women was 19%. Three quarters of men and 61% of women had been engaged in manual labour or agriculture, 24% of men and 15% of women had held administrative or corresponding jobs, and 1% of men and 24% of women had worked at home. 16% (n = 23) of men and 28% (n = 66) of women reported having and/or had been verifiably diagnosed with type 2 diabetes.

Socio-economic status

Marital status: known diabetes was less common among married subjects (p = 0.06) than among unmarried, widowed or divorced subjects (table 1).

Number of residents in household: Only one (4%) of the 18 men living alone, who also was unmarried, had previously been diagnosed with diabetes compared to 16% of the men living with someone (p = 0.09), while there was no such difference among the women (23% vs. 16%) (p = 0,1); additionally, 23 of the 29 women living alone were widowed.

Basic education: Known type 2 diabetes was more common among the men with higher basic educational level (21% vs. 12%, p = 0.18), while an opposite trend was seen among women (22% vs. 12%, p = 0.08). The differences were not statistically significant.

Previous occupation: Known diabetes was more common among the women who had been engaged in manual labour compared to those who had held administrative jobs (p = 0.06), while the figures for men were almost similar in the two groups (p = 0.2).

Self-rated income and economic status: In the male group, known diabetes was more common among those who rated their income as very good or fairly good (p = 0.01), but the opposite was true for women; more women with average or low self-rated income had previously diagnosed diabetes compared to those with very good or fairly good income (23% vs. 11%, p = 0.04). The figures for self-rated economic status were almost similar among both men and women as those for self-rated income, but the difference did not reach statistical significance.

When educational level, self-rated income and self-rated economic status were combined into a sum score, a greater proportion (33%) of the men with the highest score (i.e. best ratings) had diabetes (p = 0.09), while the corresponding figure for women was 8% (p = 0.23) (data not shown).

In logistic multiple regression analyses, self-rated income was the most powerful variable associated with known diabetes among men: the higher the income, the more prevalent was type 2 diabetes, while an opposite result was obtained for women: the lower the income, the more likely was type 2 diabetes.

Table 1. *Prevalence (%, n) of known diabetes according to variables representing the socio-economic status of the elderly study subjects*

		Men, % (n)	Women,% (n)	Total, %(n)
Marital status	married	16 (15)	13 (8)	15 (23)
	unmarried	38 (3)	26 (5)	30 (8)
	widowed	0 (0)	21 (31)	17 (31)
	divorced	0 (0)	40 (2)	29 (2)
No of residents in household	alone	4 (1)	23 (29)	20 (30)
	with someone	16 (17)	16 (17)	16 (34)
Education	more than basic	21 (5)	12 (6)	17 (11)
	basic or less than basic	12 (13)	22 (40)	18 (53)
Previous occupation	manual labour	14 (9)	23 (32)	20 (41)
	administrative	17 (4)	7 (2)	12 (6)
Self-rated income	very – fairly good	24 (10)	11 (6)	17 (16)
	average – poor	8 (8)	23 (40)	18 (48)
Self-rated economic status	very – fairly good	18 (6)	13 (5)	15 (11)
	average – poor	12 (12)	21 (41)	18 (53)

Table 2. *Odds ratios and their 95% confidence intervals of socioeconomic variables associated with type 2 diabetes in elderly men*

Variable	OR	95% CI
Marital status (married vs. not married)	0.4	0.1–2.3
Basic education; < basic compulsory vs. ≥ basic compulsory	0.7	0.2–9.6
Previous occupation	1.5	0.3–8.9
Self-rated income (good – average vs. poor)	5.1	1.3–19.8
Age/5 (yrs)	0.6	0.2–1.7

Table 3. *Odds ratios and their 95% confidence intervals of socioeconomic variables associated with type 2 diabetes in elderly women*

Variable	OR	95% CI
Marital status (married vs. not married)	1,4	0,5–3,4
Basic education; < basic compulsory vs. ≥ basic compulsory	1,5	0,5–4,6
Previous occupation	2,8	0,5–13,2
Self-rated income (poor. vs. average – good)	3,7	1,0–13,2
Age/5 (yrs)	1,4	0,9–2,1

DISCUSSION

In this study the gender distribution of non-participants was essentially the same as that of participants; 37.5% of them were men, and their mean age of 75.4 years (range 70–93 yr.) was also almost the same as that of participants. Among women, the mean age of 78.4 years (range 70–90 yr.) of the non-participants was somewhat higher than that of participants ($p = 0.03$). The marital status and educational level of participants did not differ from those of non-participants. No data were available on the other socio-economic factors of non-participants. Overall, the age and sex distribution, marital status and educational level of the elderly in the whole country are about the same as those of our study population, which suggests that the present results could be generalised to the elderly Finnish population born in the first decades of the twentieth century (17, 18). The number of subjects with known diabetes was quite small in this study, which may cause limitations to the generalisation and interpretation of the results.

In the present study, known diabetes was less common among married subjects of both genders, although there were no male divorced or widowed diabetic subjects. On the contrary, according to Rosengren and co-workers, diabetes was not associated with marital status among Swedish men in Gothenburg (13). There is no conclusive explanation for the difference between the findings on men in these two Nordic studies. However, the present results support the earlier findings that unmarried men have a higher overall risk of chronic diseases (18). Those who live alone are also more likely to be socially disabled and have higher mortality rates than those who live with others (19, 20).

According to earlier studies mainly conducted on middle-aged or younger subjects, diabetes is more common in the lower social classes in western industrialized countries. In the present elderly population, this was true for women, but not for men. There may be several explanations for this. Firstly, many of these subjects born in 1920 or earlier have experienced both social and economic burdens during their life-times, such as war and shortage of food, which may have influenced their health behaviour and health risks and their possibilities to acquire education and good jobs and thereby to improve their socio-economic status. In this generation, higher education is generally quite rare, especially among women, who have mostly been housewives or worked at home. Thus, up to these days, Finnish women have been more dependent than men on their spouses' income. The situation of the Finnish generation born in the early 20th century could be compared to the phenomenon of attainment of populations; while the women were still in a native situation, the men had started or completed their attainment of a better socio-economic status. Overall, the differences in women's and men's status and roles in society have been greater during the earlier decades than they are nowadays. Also, the differences across social classes in eating habits and health behaviour have obviously been quite remarkable during

the past decades. For example, as early as 1972, Baird concluded that the differences in eating habits were most striking among men in the social classes 1 and 2, where diabetics eat approximately 1000 kcal more than non-diabetics (21, 22).

In summary, there was a marked gender difference in the prevalence of known diabetes according to socio-economic status in this elderly Finnish population. Type 2 diabetes was more common among women with lower socio-economic status, whereas the opposite was true of men, among whom good socio-economic status was associated with diabetes (Tables 2 and 3). Thus, and also in view of the fact that dietary factors and health behaviour influence the development of diabetes, this might indicate that the socio-economic changes taking place in Finland in the 20th century have had a greater impact on the risk factors for diabetes among men with higher and women with lower socio-economic status.

REFERENCES

1. Stern MP. Invited commentary: do risk factors explain ethnic differences in type II diabetes? Am J Epidemiol. 1993 Apr 1;137(7):733–4.
2. Waspadji S, Ranakusuma AB, Suyono S, Supartondo S, Sukaton U. Diabetes mellitus in an urban population in Jakarta, Indonesia. Tohoku J Exp Med. 1983 Dec;141 Suppl:219–28.
3. Eriksson M, Wallander MA, Krakau I, Wedel H, Svarsudd K. Birth weight and cardiovascular risk factors in a cohort followed until 80 years of age: the study of men born in 1913. J. Intern. Med. 2004 Feb;255(2), 236–46.
4. Gulliford MC, Mahabir D, Rocke B. Diabetes-related inequalities in health status and financial barriers to health care access in a population-based study. Diabet Med. 2004 Jan;21(1):45–51.
5. Gikas A, Sotiropoulos A, Panagiotakos D, Peppas T, Skliros E, Pappas S. Prevalence, and associated risk factors, of self-reported diabetes mellitus in a sample of adult urban population in Greece: MEDICAL Medical Exit Poll Research in Salamis (MEDICAL EXPRESS 2002). BMC Public Health. 2004 Feb 14;4(1):2.
6. Ostbye T, Welby TJ, Prior IAM, Salmond CE, Stokes YM. Type 2 (non-insulin-dependent) diabetes mellitus, migration and westernization: the Tokelau Island Migrant Study. Diabetologia. 1989 Aug;32(8):585–90.
7. Sharma S, Malarcher AM, Giles WH, Myers G. Racial, ethnic and socioeconomic disparities in the clustering of cardiovascular disease risk factors. Ethn Dis. 2004 Winter;14(1):43–8.
8. Wandell PE, Gafvels C. Patients with type 2 diabetes aged 35–64 years at four primary health care centres in Stockholm County, Sweden. Prevalence and complications in relation to gender and socio-economic status. Diabetes Res Clin Pract. 2004 Mar;63(3):195–203.
9. Millar WJ, Wigle DT. Socioeconomic disparities in risk factors for cardiovascular disease. CMAJ. 1986 Jan 15;134(2):127–32.
10. Melnik TA, Hosler AS, Sekhobo JP, Duffy TP, Tierney EF, Engelgau MM, Geiss LS. Diabetes prevalence among Puerto Rican adults in New York City, NY, 2000. Am J Public Health. 2004 Mar;94(3):434–7.
11. Robbins JM, Vaccarino V, Zhang H, Kasl SV. Socioeconomic status and type 2 diabetes in African American and non-Hispanic white women and men: evidence from the Third National Health and Nutrition Examination Survey. Am J Public Health. 2001 Jan;91(1):76–83.
12. Medalie JH, Papier CM, Goldbourt U, Herman JB. Major factors in the development of diabetes mellitus in 10,000 men. Arch Intern Med. 1975 Jun;135(6):811–7.
13. Rosengren A, Welin L, Tsipogianni A, Wilhelmsen L. Impact of cardiovascular risk factors on coronary heart disease and mortality among middle aged diabetic men: a general population study. BMJ. 1989 Nov 4;299(6708):1127–31.
14. Gafvels C, Borjesson B, Lithner F. The social concequences of insulin-treated diabetes mellitus in patients 20–50 years of age. An epidemiological case-control study. Scand J Soc Med. 1991 Jun;19(2):86–93.
15. Diabetes mellitus: Report of a WHO Study Group. World Health Organ Tech Rep Ser. 1985;727:1–113.
16. Hiltunen L, Luukinen H, Koski K, Kivelä SL. Prevalence of diabetes mellitus in an elderly Finnish population. Diabet Med. 1994 Apr;11(3):241–249.
17. A study of special groups. Publications of the Ministry of Social Affairs and Health 1979: 14. Helsinki: Ministry of Social Affairs and Health; 1979.
18. Statistical yearbook of Finland 1992. Helsinki: Central Statistical Office of Finland. (In English, Finnish, Sweedish)
19. Forssas E, Keskimäki I, Koskinen S, Lahelma E, Manderbacka K, Prättälä R, Sihto M, Valkonen T. Explaining and reducing socioeconomic health differences: A bibliography of Finnish research publications. Report 40/1999. Helsinki: STAKES/Publications; 1999.
20. Jette AM, Branch LG. Impairment and disability in the aged. J Chronic Dis. 1985;38(1):59–65.
21. Wilkins K. Social support and mortality in seniors. Health Rep. 2003 May;14(3):21–34.
22. Baird JD. Diet and the development of clinical diabetes. Acta Diabetol Lat. 1972;9(suppl1):621–39.
23. Vannoni F, Spadea T, Frasca G, Tumino R, Demaria M, Sacerdote C, Panico S, Celentano E, Palli D, Saieva C, Pala V, Sieri S, Costa G. Association between social class and food consumption in the Italian EPIC population. Tumori. 2003 Nov-Dec;89(6):669–78.

Received April 1, 2005
Received in revised form and accepted September 19, 2005