Prevalence of Known Diabetes and Antidiabetic Therapy Between 1984/1985 and 1999/2001 in Southern Germany

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Between 1995 and 2025 the prevalence of diabetes is projected to rise from 135 million to 300 million affected worldwide, with the most dramatic increase occurring in developing countries; most of these cases will be type 2 diabetes (1). The highest prevalences are seen in populations with heightened genetic susceptibility, high caloric intake, reduced physical activity, and a subsequent progressive rise in overweight and obesity (2). The aim of the present study is to show the prevalence of known diabetes as well as the antidiabetic treatment over the period 1984/1985 to 1999/2001 using the data of four surveys of independent representative samples of a 25- to 74-year-old population of Southern Germany.

RESEARCH DESIGN AND METHODS

— Three independent cross-sectional surveys were carried out in 1984/1985, 1989/1990, and 1994/1995 to estimate the prevalence and distribution of cardiovascular risk factors among men and women in the Monitoring Trends and Determinants in Cardiovascular Disease (MONICA) study (3), which was conducted in the Augsburg region. From 1999 to 2001, the Cooperative Health Research in the Region of Augsburg (KORA) Survey 2000 was conducted in the same study region and with the same design as in the previous surveys. The age range was restricted to individuals aged 25–64 years in the first survey and 25–74 years in the other three surveys.

During a standardized interview, participants were asked whether they suffer from diabetes and if the diagnosis was made by a physician. All subjects were also asked to provide details on their current medication. Thus, previously known diabetes was defined based on self-reported physician diagnosis or the use of antidiabetic agents.

Statistical analysis

Data are given as proportions with 95% CIs. Age- and sex-specific prevalences of known diabetes were directly standardized to the German population (population as of 31 December 2000). All analyses were performed using the Statistical Analysis System (version 8.2; SAS Institute, Cary, NC).

RESULTS

— The total prevalence for men aged 25–64 years was 2.7% in 1984/1985 and 2.5% in 1999/2001, and the corresponding prevalences for women were 2.0% and 2.7%, respectively. In both sexes, prevalences of known diabetes increased sharply with age. In the age-group 35–44 years, the prevalence of diabetes was <2% in men and women over the time period. On the contrary, ~11% of the 65- to 74-year-old men and women suffered from diabetes. No statistically significant trends were found for any single age-group or sex (Table 1).

In the first survey, 42% of the study participants with diabetes were exclusively treated with sulfonylureas and 45% with diet alone (Table 1). However, in 1999/2001, only 15% of the participants with diabetes were treated with sulfonylureas and 18% with diet alone. Diabetes therapy with biguanides and/or acarbose became relevant in 1994/1995; in 1999/2001, already 46% of the participants with diabetes were treated with these agents. The use of insulin increased from 12.5% in 1984/1985 to 28% in 1999/2001. Of those treated with insulin, ~8% in 1989/1990 and 12% in the fourth survey were also taking one or more oral antihyperglycemic agents, such as biguanides, acarbose, and sulfonylureas. Despite the introduction of new classes of oral agents, sulfonylureas were still frequently used in diabetes therapy in 1999/2001.

CONCLUSIONS

— In Southern Germany, the prevalence of known diabetes did not increase over 17 years in the 25- to 74-year-old population. During the study period, efforts were made toward intensified glucose control in persons with diabetes, as the trends in antidiabetic treatment demonstrated. A Swedish study reported no increase in the prevalence of known diabetes in the adult population below the age of 65 over the time period 1986–1999, although a trend for increasing fasting blood glucose was noted in the population (4). Apart from this research, most studies from other countries (5–8) reported an increasing prevalence of known diabetes. Reasons for this finding

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Received and accepted for publication 20 August 2004.

Abbreviations: KORA, Cooperative Health Research in the Region of Augsburg; MONICA, Monitoring Trends and Determinants in Cardiovascular Disease Augsburg.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

Table 1—*Age-specific prevalences of known diabetes and antidiabetic medication in men and women in four population surveys, 1984–2001*

	Survey year							
	1984/1985		1989/1990		1994/1995		1999/2001	
Age for men (years)								
25–34	2/464	0.4	1/470	0.2	0/444	—	2/409	0.5
35–44	6/485	1.2 (0.3–2.2)	4/462	0.9	2/457	0.4	4/419	1.0
45–54	11/539	2.0 (0.9–3.2)	29/520	5.6 (3.6–7.6)	20/482	4.2 (2.4–5.9)	10/418	2.4 (0.9–3.9)
55–64	41/535	7.7 (5.4–9.9)	45/510	8.8 (6.4–11.3)	44/531	8.3 (5.9–10.6)	30/443	6.8 (4.4–9.1)
65–74	—	—	54/520	10.4 (7.8–13.0)	54/491	11.0 (8.2–13.8)	43/397	10.8 (7.8–13.9)
25–64*	60/2023	2.7 (2.0–3.4)	79/1962	3.6 (2.8–4.4)	66/1914	3.0 (2.3–3.7)	46/1689	2.5 (1.8–3.2)
25–74*	—	—	133/2482	4.6 (3.8–5.3)	120/2405	4.1 (3.4–4.8)	89/2086	3.7 (2.9–4.4)
Age for Women (years)								
25–34	1/463	0.2	0/476	—	1/462	0.2	2/439	0.5
35–44	3/523	0.6	2/486	0.4	5/514	1.0	8/464	1.7 (0.5–2.9)
45–54	7/515	1.4 (0.4–2.4)	13/539	2.4 (1.1–3.7)	16/510	3.1 (1.6–4.7)	11/457	2.4 (1.0–3.8)
55–64	33/498	6.6 (4.4–8.8)	35/503	7.0 (4.7–9.2)	32/516	6.2 (4.1–8.3)	30/438	6.9 (4.5–9.2)
65–74	—	—	52/454	11.5 (8.5–14.4)	49/449	10.9 (8.0–13.8)	30/371	8.1 (5.3–10.9)
25–64*	44/1999	2.0 (1.5–2.6)	50/2004	2.3 (1.7–2.9)	54/2002	2.5 (1.8–3.1)	51/1798	2.7 (2.0–3.5)
25–74*	—	—	102/2458	3.6 (2.9–4.2)	103/2451	3.7 (3.0–4.4)	81/2169	3.5 (2.8–4.2)
Antidiabetic treatment								
Insulin	13 (12.5)		23 (9.8)		24 (10.8)		28 (16.6)	
Sulfonylurea	44 (42.3)		108 (46.0)		59 (26.5)		26 (15.4)	
Biguanides and/or acarbose	—		1 (0.4)		22 (9.9)		35 (20.7)	
Insulin and sulfonylurea	—		18 (7.7)		10 (4.5)		7 (4.1)	
Insulin and biguanides /acarbose	—		1 (0.4)		4 (1.8)		8 (4.7)	
Sulfonylurea and biguanides/acarbose	—		2 (0.9)		26 (11.7)		30 (17.8)	
Insulin, sulfonylurea and biguanides/acarbose	—		—		8 (3.6)		5 (3.0)	
No antidiabetic drug (diet only)	47 (45.2)		82 (34.9)		70 (31.4)		30 (17.8)	

Data are percent, % (95% CI), or *n* (%). *Age standardizing according to the age distribution of the population of the Federal Republic of Germany on 31 December 2000.

may include increased incidence, earlier diagnosis of the disease, or improved survival after diagnosis and a general increase in life expectancy. While interpreting our data, the likelihood of underreporting or selection bias must be appreciated. Since known cases of diabetes only represent the tip of an iceberg of hyperglycemia within the population, the true prevalence of diabetes must also include the number of undiagnosed cases. No data are available concerning trends in undiagnosed diabetes in the present study. However, in the 1999/2001 survey, an oral glucose tolerance test was performed in 55- to 74-year-old nondiabetic study participants. In this subset, the total diabetes prevalence was ~17%; an additional 23% of the population had impaired glucose tolerance or impaired fasting glucose. Thus, half of the total cases with diabetes were undiagnosed (9). Nevertheless, it seems unlikely that an increasing incidence of diabetes would be masked because of reduced efforts in making the diagnosis over the time period. Self-reported diabetes has an obvious risk of selection bias, since patients with known diabetes may be more likely to refuse to participate in surveys because they are already under medical surveillance. In the present study, the participation rate decreased only slightly from 1984/1985 (79%) to 1994/1995 (75%) but decreased to 67% in the 1999/2001 survey. In that survey, it was estimated that nonparticipants were about two times more likely to suffer from diabetes (9), suggesting that the prevalence of known diabetes could have been underestimated to a greater extent, and thus an increase in diabetes prevalence between 1994/1995 and 1999/2001 could have been masked. By all means, the aging of the population and the trends to high caloric intake, reduced physical activity, and a subsequent progressive rise in obesity are leading to a true increase in the incidence and prevalence of type 2 diabetes (2). Accordingly, one further reason for the stable prevalence of diabetes observed in the present study might be a constancy of these factors in the German population over the time period. Taken together, accurate quantification of the prevalence of diabetes in a population seems very complex and deserves detailed examination.

Acknowledgments— The KORA research platform and the MONICA Augsburg studies were initiated and financed by the GSF National Research Centre for Environment and Health, which is funded by the German Federal Ministry of Education, Science, Research and Technology and the State of Bavaria.

We thank all the members of the GSF Institute of Epidemiology who were involved in the planning and conduct of the study and also Professor U. Keil (University of Münster, Germany), who is the principal investigator of the MONICA Augsburg study. Finally, we express our appreciation to all study participants.

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