Younger patients with type 2 diabetes need better glycaemic control: results of a community-based study describing factors associated with a high HbA_{1c} value

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SUMMARY

This study of 845 patients with type 2 diabetes was conducted in 12 primary care general practices in a geographically cohesive region in Germany. It showed that about a fifth of these patients with known diabetes had a HbA_{1c} of 8% or over, and therefore are in need of better glycaemic control. Younger patients seem to be at special risk for high HbA_{1c} values, and they should receive particular attention with respect to preventive measures for better glycaemic treatment.

Keywords: *type 2 diabetes; HbA_{1c}; observational study.*

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Introduction

THE presence of hyperglycaemia leads to an increase in the levels of HbA_{1c}, and is therefore a useful measurement for the retrospective assessment of metabolic control within the previous three months in patients with diabetes mellitus.[1] As microvascular and neuropathic complications are associated with quality of glycaemic control, measurement of HbA_{1c} levels enables patients in need of improved diabetic therapy to be identified, reducing the risk of late complications in this chronic disease.

A population-based study was conducted, which included all patients with type 2 diabetes who presented at the surgeries of several general practitioners (GPs) in a geographically cohesive region, in order to describe HbA_{1c} distribution and to identify factors associated with a high HbA_{1c} value.

Method

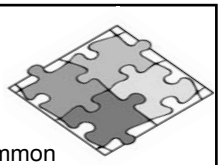
All GPs providing primary care in one region in southern Germany participated in patient recruitment. Patients with known type 2 diabetes, who were aged 40 years or older, and who presented at one of the 12 participating practices between April and June 2000, were included in this study. Diabetes was defined as having ever fulfilled the following diagnostic criteria: non-fasting blood glucose of >11.2 mmol/l (>200 mg/dl) or a fasting glucose of ≥7.06 mmol/l (≥126 mg/dl).

The HbA_{1c} distribution and the proportion of patients with an HbA_{1c} of 8% or higher was determined according to various personal factors, including sociodemographic, lifestyle, and medical characteristics. Multivariate logistic regression analysis was then carried out and a backward selection strategy ($P<0.1$) used to identify the main independent determinants of a HbA_{1c} value of 8% or higher.

Results

In total, 869 patients (88% of those eligible) with type 2 diabetes participated in the study. No recent HbA_{1c} value was available for 24 (2.8%) patients, and only 845 patients (97.2%) were included in the final analysis. Women comprised 52.6% of the patients. The mean age of patients with diabetes was 67.3 years (standard deviation [SD] = 9.63, range = 40–91 years), over one-third of them (37.7%) were between 60 and 80 years old, and 71.3% were married. The time since diagnosis was less than five years among 38.7% of the patients, five to ten years among 32.5% of the patients, and more than ten years among 28.8% of the

HOW THIS FITS IN



What do we know?

Diabetes mellitus is one of the most common endocrine diseases in developed countries and prevalence is currently increasing. Quality of metabolic control determines the risk of the development of diabetes-associated vascular and neuropathic conditions.

What does this paper add?

The study describes factors associated with a high HbA1c level in a community-based sample of patients with known diabetes mellitus and identifies subjects in need of improved diabetic therapy./ Notably, younger patients had an increased risk for high HbA1c values and should therefore receive particular attention with respect to preventive measures for better glycaemic treatment.

patients.

The arithmetic mean of the HbA_{1c} values was 7.1% (SD = 1.4), the median (25th percentile/75th percentile) was 6.9% (6.1%/7.8%). One hundred and seventy-eight patients (21.1%) had a HbA_{1c} value of ≥8%.

Table 1. Variables associated with a high HbA_{1c} level: results of bivariate and multivariate analysis.

	n	Proportion of HbA_{1c} ≥8%[a]		Odds ratio (95% CI)[b]
		%	*P*-value	
Sex				
Male	398	21.6		
Female	441	20.9	0.79	NS
Age in years				
40–59	202	31.7		1
60–69	318	17.3		0.40 (0.24–0.65)
70–79	255	19.2		0.60 (0.36–1.02)
≥80	68	13.2	0.0005	0.39 (0.16–0.94)
Number of years of school education				
≤9	651	22.1		
10–12	108	14.8		
≥13	60	18.3	0.20	NS
Marital status				
Single	35	25.7		
Married	596	20.5		
Widowed	176	25.6		
Separated	29	24.1	0.86	NS
Occupational status				
Employed	139	28.1		
Retired	540	18.5		
Housewife	141	20.6		
Other	12	50.0	0.006	NS
Level of social support[c]				
None	39	33.3		
1	128	27.3		
2	285	21.1		
3 or more	349	17.2	0.02	NS

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Table 1 shows the results of the bivariate association of various sociodemographic, lifestyle, and medical factors with a high HbA_{1c} value. In addition, unconditional logistic regression and a stepwise backward selection procedure to find the independent determinants of a high HbA_{1c} of 8% or over were used. There was no significant association on multiple regression analysis between HbA_{1c} level and sex, level of education, family status, occupational status, level of social support, smoking, alcohol consumption, physical leisure activity, body mass index, and patients' self-rating of health status. There was, however, an association between HbA_{1c} level and age, time since diagnosis of diabetes, diabetic medication, and physicians' assessment of compliance.

Discussion

About one-fifth of the patients in general practice with known diabetes in this study had a HbA_{1c} level of 8% or higher, and they should therefore receive more intensive treatment. Younger patients, in particular, seem to have a need for more intensive glycaemic control.

As the prevalence of diabetes is set to rise in almost every country within the next years,[2] the associated burden for the individual and for society will also rise. The extent of associated morbidity and mortality will depend mainly on the frequency of complications of diabetes. It has been clearly demonstrated that better pharmacological treatment of patients with diabetes has beneficial effects on almost all the complications associated with diabetes,[3,4] and that it is cost effective.[5]

When looking at the results of this study, the following strengths and weaknesses should be considered. This was a population-based study that included all patients within a defined geographical region, irrespective of their medical insurance affiliation. Because almost all patients have access to health care in Germany, and since all primary care physicians within a cohesive region participated, and most patients with diabetes usually consult their primary care giver once every three months, we are confident that the study population comprised almost all patients with type 2 diabetes in primary medical care in the study region. However, patients who did not seek medical care and patients who had restricted access to primary care for other reasons were certainly under-represented in this study.

Finally, the evidence presented here was based on a cross-sectional study design, which does not allow firm quantitative conclusions to be drawn with respect to the temporal and causal sequence of the associated factors. For example, it is quite plausible that poor compliance will result in an increased risk of a high HbA_{1c} value. On the other hand, it cannot be ruled out that a physician's judgement of a patient's compliance may also have been influenced by the physician's knowledge of a high HbA_{1c} value. A longitudinal study is needed to clarify the temporal relationship of the factors.

Bearing all this in mind, this study suggests that about one-fifth of patients with known diabetes in a primary care setting in Germany have a HbA_{1c} of 8% or higher and should

receive more intensive treatment. Patients with type 2 diabetes who are under 60 years of age seem to be particularly at risk of high HbA_{1c} values, and should therefore receive particular attention with respect to preventive measures for better glycaemic treatment.

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Table 1 (continued). Variables associated with a high HbA_{1c} level: results of bivariate and multivariate analysis.

	n	Proportion of HbA_{1c} ≥8%[a]		Odds ratio (95% CI)[b]
		%	*P*-value	
Smoking history				
Never	435	20.7		
Ex-smoker	249	22.1		
Current smoker	66	30.3	0.21	NS
Alcohol consumption				
Abstainer	307	24.4		1
Other	480	18.1	0.03	0.69 (0.46–1.02)
Hours of leisure time physical activity per day				
None	184	23.3		
Up to 2 hours/day	222	18.0		
More than 2 hours/day	348	22.1	0.36	NS
Body mass index (kg/m^2)				
<25.85	206	15.5		
25.85–28.33	206	21.8		
28.34–31.99	208	21.6		
≥32.00	206	24.3	0.16	NS
Time since diagnosis of diabetes				
<1 year	58	5.2		1
1–4 years	236	14.0		2.67 (0.71–10.26)
5–10 years	275	25.1		5.02 (1.32–18.97)
>10 years	243	27.6	<0.0001	4.28 (1.11–16.58)
Diabetic medication				
Diet only	261	6.1		1
Sulphonylureas	328	22.8		1.53 (1.00–2.33)
Metformin	300	26.7		1.54 (1.01–2.35)
Insulin	188	38.1	<0.0001	2.95 (1.84–4.75)
Compliance (physicians' assessment)				
Very good	169	10.7		1
Quite good	377	14.9		1.20 (0.68–2.15)
Bad	243	30.9		3.05 (1.72–5.42)
Very bad	42	61.9	0.02	17.03 (6.93–41.81)
Health status (patients' self-rating)				
Excellent or very good	44	18.2		
Good	439	18.5		
Less good	301	23.3		
Poor	46	37.0	0.02	NS

[a]Bivariate analysis (*P*-value): χ^2 test for independence of proportion ≥8% from group level (results of bivariate analysis). [b]Multivariate analysis: results of unconditional logistic regression — only independent predictors of a high HbA_{1c} value as identified by a stepwise backward variable selection procedure were included. 1 = reference value. [c]Level of social support was assessed with the following question: 'How many people do you have on whom you can count on and with whom you can talk about personal problems?'. CI = confidence interval. NS = not statistically significant, therefore not included in the final model.

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