Failure to prevent nicotine addiction in young people with diabetes

E A Masson, I A MacFarlane, C J Priestley, M E Wallymahmed, H J Flavell

Abstract

The habit of smoking is usually acquired at a young age and it is particularly undesirable in individuals with diabetes. A study was carried out to assess objectively the prevalence of smoking in young patients with diabetes and whether younger age at onset of diabetes (implying exposure to health education) reduced the incidence of smoking. Ninety nine young adults with diabetes attending the routine clinic were studied using a structured interview and assay of a urinary nicotine metabolite (cotinine). Forty eight percent of the cohort were smoking (raised urinary cotinine), although only 31% admitted to smoking. Thirty eight percent of the patients with childhood onset diabetes, 56% of the adolescent onset, and 47% of the young adult onset patients were smoking. Smoking was not related to glycaemic control or body mass index. In conclusion, smoking is common in young patients with diabetes and is often denied. Conventional health education does not appear to prevent children and adolescents with diabetes from starting to smoke. Anti-smoking policies and health education must therefore be reinforced and improved.

People with diabetes have a greatly increased prevalence of coronary artery, cerebral, and peripheral vascular disease.¹ Cigarette smoking is another major risk factor for the development of atheroma and may interact with diabetes to magnify its atherogenic effect.² Smoking has also been implicated in the development and progression of diabetic microvascular disease (nephropathy and retinopathy).³ In a recent consensus statement, the American Diabetes Association has stressed the importance of people with diabetes not smoking and recommends aggressive attempts to deter people from acquiring the habit and to persuade smokers to stop.⁴ A smoking habit is usually established in adolescence and nicotine addiction is so powerful that most smokers are unable to stop, despite wishing to do so.⁵ It is obviously a very serious event if a young person with diabetes becomes addicted to nicotine. In order to assess the extent of nicotine addiction we have surveyed the smoking habits of young people with insulin dependent diabetes attending our young adult diabetic clinic. In addition we wished to ascertain whether the antismoking counselling and health education given to patients who developed diabetes in childhood and adolescence had been successful in preventing smoking. The validity of the smoking history was assessed using

urinary cotinine (a nicotine metabolite) measurement.

Patients and methods

Ninety nine consecutive insulin dependent diabetic patients attending the young adult clinic at Walton Hospital Diabetes Centre, Liverpool were studied (53 male). The mean (SD) age was 21.5 (3.9) years (range 15-31 years). The mean (SD) duration of diabetes was 7.3 (5.2) years (range 0.5-24 years). All had normal renal function (serum creatinine concentration <100 µmol/l). Twenty four patients had developed diabetes as children (0-10 years of age), 43 as adolescents (11-15 years of age), and 32 as young adults (>15 years of age). The patients who had developed diabetes in childhood or early adolescence were usually transferred from the local paediatric diabetic clinic at the age of 16 years.

The young adult clinic had been established by one of the authors (IAM) six years previously. During this time all patients had received regular antismoking counselling from the same doctor stressing the health effects of smoking and the added risk of retinopathy and nephropathy. At the paediatric diabetic clinic older children and their families are warned of the adverse health effects of smoking.

A questionnaire on smoking was completed by each patient with the help of a diabetes specialist nurse (MEW), with questions relating to current or past smoking habit, age of starting smoking, details of family smoking habits, knowledge of health effects of smoking, and attitudes to smoking. Whole blood glycated haemoglobin (HbA_{1c}, non-diabetic range <8%) and body mass index (BMI) were also measured. An aliquot of the urine sample that had been tested for glucose and protein at that visit was assayed for cotinine with a polarisation fluoroimmunoassay using commercial reagents (Perkin-Elmer). The urinary cotinine:creatinine ratio (Cot:Cr) in µg/mg was calculated in order to allow for variations in urine volume. The patients were not told in advance of the questionnaire that their urine sample was to be tested for cotinine. No patient claimed to use nicotine chewing gum or other nicotine containing products. Control subjects for the cotinine assays were 22 non-diabetic hospital staff who were aware that their smoking history was being validated by urinary cotinine measurements. Eighteen of these controls denied smoking and four were regular smokers.

Standard parametric and non-parametric statistical methods were used as appropriate.

Walton Hospital,
Liverpool,
Diabetes Centre
E A Masson
I A MacFarlane
C J Priestley
M E Wallymahmed

Department of Clinical
Chemistry
H J Flavell

Correspondence to:
Dr E A Masson,
Department of Medicine,
University of Liverpool,
PO Box 147, Liverpool
L69 3BX.

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Results

The distribution of urinary Cot:Cr ratios of the patients with diabetes and the non-diabetic controls who claimed to smoke and those who denied doing so is shown in the figure. The patients with diabetes are displayed as three groups (childhood onset diabetes, 0–10 years old; adolescent onset, 11–15 years old, young adult onset, >15 years old). In the control subjects there was a clear separation in the Cot:Cr ratios between those who admitted to smoking and those who denied doing so. The non-smoking range of Cot:Cr ratios in the controls was 0.1–0.9 $\mu\text{g}/\text{mg}$ (median 0.3). Cot:Cr ratios above this range ($\geq 1 \mu\text{g}/\text{mg}$) were therefore taken to indicate active smoking in the preceding 24 hours. Of the 99 patients with diabetes, 31 (14 female) admitted current smoking and 14 said they were ex-smokers. However from the figure it can be seen that 17 of the 68 who claimed not to smoke had Cot:Cr ratios greater than 1 $\mu\text{g}/\text{mg}$ suggesting active smoking. Therefore, including these 17 patients, 48 (48.5%) of the study group were smoking (25 female). This objective marker of smoking demonstrated that the habit was common in all three groups of diabetic patients and there was no significant differences between them (38% childhood onset, 56% adolescent onset, 47% young adult onset). There was no significant difference in the concentration of cotinine in the urine of the three groups of patients.

The median age at starting smoking for those who admitted the habit (65% of smokers) was 16 years (range 10–20 years). Cot:Cr ratios were not related to glycaemic control (smokers mean (SD) HbA_{1c} was 11.8 (2.9), non-smokers 10.8 (2.6); this was not significant). BMI and smoking were not related (smokers mean (SD) BMI was 22.9 (2.9); non-smokers 23.8 (2.8); this was not significant). The 48 diabetic smokers were all aware that smoking had deleterious

effects on health and 86% of them were aware that smoking could make diabetic complications worse. Smoking was common in the families of the patients with diabetes who were smokers: 38 of the 48 smokers lived with one or more family members who smoked. However 30 of the 51 non-smokers also had a household family member who smoked. The great majority (90%) of admitted smokers wished to stop (generally because of health worries) and many had tried unsuccessfully to do so.

Discussion

Urinary cotinine is the best measure of smoking activity, reflecting the number of cigarettes smoked in the previous 24 hours in people with normal renal function.⁶ The importance of using an objective measure of active smoking in people with diabetes is well established.^{7–9} This study in young patients with insulin dependent diabetes again illustrates that answers to smoking questionnaires must be viewed with caution. Thirty one percent of the patients in this study admitted to smoking but the urinary cotinine assay suggested that up to 48% were in fact smoking. We have no objective data on the smoking habits of the local non-diabetic young adult population, although questionnaire surveys indicate that 25–35% of young adults admit to smoking.⁵ It is possible that many of our young patients denied their smoking habit because they did not want to disappoint the nurse specialist or the doctor in the clinic. A similar phenomenon occurs when patients falsify the results of home blood glucose and urine glucose measurements in order to please their medical attendants.¹⁰

It is clear from our results that the diagnosis of diabetes in childhood and the antismoking advice at the paediatric and young adult diabetic clinics does not have a significant influence on the subsequent acquisition of a smoking habit. Also the diagnosis of diabetes and antismoking advice in the young adult smoker appears to have little effect on nicotine addiction already present. We have previously suggested that people with diabetes may have particular difficulty in stopping smoking, perhaps because of the social and dietary constraints that diabetes already imposes.^{7–9} The reduction of nicotine addiction in our young patients is a major challenge because this habit undoubtedly increases the already substantial risk of developing macrovascular disease and may exacerbate microvascular disease. Physicians caring for young people with diabetes should consider using objective markers of smoking such as urinary cotinine measurements, and must devise more effective methods of preventing nicotine addiction and assisting smokers to stop.

Results of urinary Cot:Cr in $\mu\text{g}/\text{mg}$. Groups according to age at onset of diabetes: C=control; CH=childhood (0–10 years); AD=adolescent (11–15 years); YA=young adult (>15 years). Open circles are subjects admitting to smoking; closed circles are subjects who denied smoking. Note vertical log scale. Broken line represents the division between active smoking and non-smoking levels.

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