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The Effects of Alcohol Consumption in People with Diabetes Mellitus: A study based on a cohort of 7,418 patients seen at St Thomas' Hospital between 1979 and 1998

The Aim of the study

To examine if alcohol consumption declared by people with diabetes is associated with poor metabolic control, increased risk of complications and premature mortality

Methods

The electronic case records of total of 7,418 diabetic patients who were seen in the diabetes clinic at St Thomas' Hospital between 1979 and 1998 were selected for this study. All of these patients were registered with a standardised structured 'First Visit' history and examination on a computerised diabetes clinical records system – Diabeta and had a mean of 12 years of follow-up. The baseline data, such as age, race, sex, alcohol consumption, smoking history, type of diabetes, Body Mass Index (BMI), blood pressure (BP), HbA1, Vibration Perception Threshold (VPT) for the ankle and toe and history of diabetes complications (e.g. stroke, myocardial infarction, angina, retinopathy, peripheral neuropathy, protein in the urine and amputation etc,) were recorded in a coded form. A multiple regression test was applied to identify the association between stated alcohol consumption and diabetes control/complications with consideration of confounding factors.

For all deceased patients, a death certificate was obtained through record linkage between Diabeta and NHS Central Register (NHS CR). The final outcome (e.g. date and causes of death) was examined. Mortality rate was adjusted by age, sex, race and smoking. The time related Cox Hazard Proportion test was used to examine the risk of death for all causes of death with confounding factors correction applied.

In a separate study, current alcohol consumption was assessed in 1140 patients, using questionnaires. Of these 684 patients (male 390 and female 294) had alcohol consumption previously recorded at their first visit to St Thomas' Hospital. The demographic data of these patients' is presented. Their average current alcohol consumption was calculated by multiplying the number of units that the patients said that they currently consumed by the frequency of their drinking per month, week or

day. Patients were grouped into 0, ≤3, 3-21 and ≥22 for male and 0, ≤2, 2-14, ≥15 for females according to the average units consumed per week. This was also broken down into alcohol intake groups (none, trivial, moderate and heavy) comparable to that assessed at the first hospital visit.[1] Their current alcohol intake was compared with what they previously reported to see if their alcohol drinking habits had changed. The change in alcohol consumption estimate between the first to current visit and the number of years between the two were estimated.

Results

Levels of alcohol consumption were classified into four groups: none, trivial (less than 2 units per week), moderate (more than 2 units per week and less than 6 units per day) and heavy (more than 6 units per day) drinking. The number of patients in each group were 2858, 2070, 2149, 341 respectively. It is shown that a large proportion of moderate (72.71%) and heavy drinkers (91.79%) were more likely to be men and of younger age (48.6±16.4 and 51.8±11.0 years). A high proportion of Asian (63.6% of 615 patients) and 'other' races (59.8% out of 127 patients) did not admit drinking alcohol at all. Patients with trivial and moderate alcohol consumption were mainly Caucasians (63.6% out of 4539 patients) and Afro-Caribbean (56.7% out of 1693 patients). Multi-linear regression was used to describe the relationship between the clinical measurements and the declared alcohol consumption, adjusted for age, sex, race and smoking. A significant positive correlation was found between blood pressure (BP) and all levels alcohol consumption ($p<0.05$). Better metabolic control (as indicated by a lower HbA1), less peripheral neuropathy (as indicated by a lower age-corrected VPT at the ankle and toe) were observed in both trivial and moderated drinkers.

Multi-logistic regression results showed that moderate or trivial alcohol consumption was associated with a significant risk reduction for the prevalence of proteinuria, peripheral neuropathy, stoke, angina, hypertension and amputation at the first hospital

[1] When the computerised clinical record system was first developed at St Thomas' in 1973 there were no accepted definitions of healthy drinking. The categories of Nil, Trivial, Moderate and Heavy were invented by Drs Pyke & Watkins (King's College Hospital) and Drs Lowy and Sonksen (St Thomas' Hospital) as part of a collaborative British Diabetic Association (BDA – now Diabetes UK) Research Project

visit. On the other hand, there was the expected association between peripheral neuropathy and heavy alcohol consumption (odd ratio: 1.41 (1.02-1.96) $p<0.05$).

There were 1,314 (23.02%) deaths out of 5,707 patients identified with Type 1 and 2 diabetes [679 male (58.03%), 491 female (41.97%)]. The mean age of death was 72.2±9.5 years (69.0±11.5 for males and 71.8±11.6 for females). The numbers of patients / deaths are 2584 / 518 in non alcohol consumers; 1627 / 379 in occasional alcohol consumers; 1741 / 354 in moderate alcohol consumers; 206 / 63 in heavy alcohol consumers. The adjusted mortality rates (adjustment for age, sex, race, smoking) were calculated for the four groups with a 95% confidence interval. For all-causes of death, mortality rates were 23.2 (21.9-24.4), 21.7 (20.3-23.1), 20.1 (18.5-21.6) and 10.5 (9.0-12.1) per 100 person-years. It was thus demonstrated that there was a significant decrease in mortality rates in association with stated increasing alcohol consumption. The main causes of death for the cohort were Coronary Heart Disease (CHD) (37.85%), Cerebrovascular Disease (CVD) (11.67%) and Cancer (18.34%). Among those who died of CHD, the mortality rates within the groups were 8.00 (7.06 - 8.93), 7.39 (6.41 - 8.36), 6.68 (5.64 - 7.72) and 2.02 (1.25 - 2.78). There was a significant decrease in overall mortality rate with increasing alcohol consumption ($p<0.05$) but no significant effect of alcohol consumption on risk of death from CVD. An unexpected significant reduction in mortality rate for cancer was found in heavy drinkers (1.36 (0.72 - 2.00)) compared to moderate (3.28 (2.51 - 4.05)) and occasional drinkers (3.78 (3.06 - 4.51)). Heavy drinking was however, also associated with a higher mortality rate from gastrointestinal conditions and injuries.

In multivariable Cox analysis (adjustment for age, sex, race, smoking, BMI, BP (systolic), history of diabetes complications), it was shown that moderate drinkers had 20~40 % deduction of risk of death from all-causes (0.85 $p<0.05$), and CHD (0.78, $p<0.05$) when compared to the 'no alcohol' drinking group (relative risk = 1.0). Heavy drinking however, was related to more than 4 times increased risk of death from gastrointestinal diseases (4.07 $p<0.05$).

Within the relatively small group of 192 Type 1 diabetic patients who died, Cox analysis showed that there was no significant effect of alcohol consumption on death from all-causes and CHD. A lower risk of death from renal disease was however seen

in the moderate drinkers (0.11 $p<0.05$)). In these Type 1 patients, heavy drinking was associated with a seven fold increased risk of death from gastrointestinal diseases, but it was not statistically significant ($p=0.08$). For the 1548 Type 2 patients who died, similar results were observed as were seen in the total study population, with the exception that heavy drinking was associated with a more than 7 fold increased risk in suffering an 'undiagnosed cause of death' ($n=8$, 7.29 $p<0.05$).

Results from the survey showed that patients who did not consume alcohol at first visit were unlikely to do so over time. 95.12% men and 92.3% women who didn't drink alcohol at first visit were either not or rarely drinking at the present time. For those who did drink at the first visit (e.g. trivial, moderate and heavy), a high percentage of patients (44.7%, 49.7%, 43.6% for men, 50.3%, 43.6%, for women) were likely to consume the same amount of alcohol at their current survey. Among those patients who consumed alcohol at the first visit (including trivial, moderate and heavy drinkers), nearly half of them were likely to shift in either direction into the neighbouring groups.

Conclusions

Moderate drinking may result in a better blood glucose control, better sensation in the feet and less risk of developing diabetes complications, such as proteinuria, peripheral neuropathy, stoke, angina, hypertension and amputation. Our study demonstrates that heavy drinking is related to higher BP and prevalence of peripheral neuropathy.

Moderate drinking may reduce the risk of death from all-causes and Coronary Heart Disease in particular for people with diabetes. Heavy drinking is related to a higher risk of death in alcohol related diseases (e.g., gastrointestinal and injuries).

We concluded from the recent survey that patients are rather stable in their drinking habits. Therefore changing alcohol consumption habits over time should not affect our results that were based on alcohol intake at first visit.

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