Nutrition, Metabolism & Cardiovascular Diseases (2007) 17, 598–608

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Nutrition, Metabolism & Cardiovascular Diseases

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High intake of alcohol is associated with newly diagnosed diabetes in 60 years old men and women

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Received 16 February 2006; received in revised form 20 April 2006; accepted 16 May 2006

KEYWORDS
Diabetes mellitus;
Alcohol intake;
Sweden

Abstract *Background and aims:* Low or moderate alcohol intake has been found to be protective against the incidence of diabetes, while conflicting results have been found regarding high alcohol intake. This study aimed at evaluating the effect of alcohol intake on newly diagnosed diabetes among subjects aged 60 years in relation to anthropometric measurements, life-style and socio-economic factors.
Methods and results: A population-based cross-sectional study of 4106 individuals, 1973 men and 2133 women, aged 60 years, in Stockholm County, Sweden. Medical history, socio-economic factors and life-style data were collected by a questionnaire and a medical examination including laboratory tests. High total intake of alcohol, i.e. >30 g/day vs. 0–30 g/day, was significantly noted more often in newly diagnosed diabetes in men (OR 2.72, 95% CI 1.70–4.34), even when adjusting for other factors, i.e. anthropometric measurements, life-style, socio-economic and dietary factors (adjusted OR 1.94, 95% CI 1.17–3.23); a high intake of spirits, i.e. >15 g/day vs. 0–15 g/day, was significantly more often observed among women (OR 3.97, 95% CI 1.50–10.50), however, it was not significant after adjustment (OR 2.23, 95% CI 0.67–7.42).
Conclusion: High intake of alcohol among men was associated with increased risk of diabetes even when adjusting for other factors.

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doi:10.1016/j.numecd.2006.05.005

Introduction

There is a strong link between the development of type 2 diabetes and lifestyle factors. Overweight, and especially central obesity, as well as physical inactivity, has been found to be a powerful predictor for development of diabetes [1–4]. It is estimated that more than 90% of cases of type 2 diabetes could be prevented with the adoption of a prudent diet, avoidance of overweight and obesity, engagement in moderate to vigorous physical activity, non-smoking and moderate alcohol consumption [5].

However, the relationship between alcohol and the risk of type 2 diabetes seems to be complex. A J-shaped relationship has been found, according to a review, with a decreased risk in incidence of type 2 diabetes among subjects with a moderate intake of alcohol (one to three drinks per day, corresponding to 12–36 g alcohol/day) compared to non-drinkers, and increased risk among heavy drinkers (>3 drinks per day, corresponding to more than 36 g alcohol/day) compared to moderate drinkers [6]. Besides, a 30% lower risk of type 2 diabetes with moderate alcohol consumption was found according to two recent meta-analyses, the first including 15 prospective observational studies [7], and the second 13 cohort studies [8]. On the other hand, in some studies a lower risk of diabetes with higher alcohol intake has been found [9–11].

The reason for the decreased risk of diabetes in subjects with moderate intake of alcohol seems to be an increased insulin sensitivity, as reported in a review by van de Wiel [12]. However, alternative reasons have also been suggested, e.g., that the increased insulin sensitivity could be explained or mediated by a more favourable central adiposity profile [13,14]. Experimental studies have found different results, e.g., Avogaro et al. [15] found an effect by alcohol in itself, while Flanagan et al. [16] found no change in insulin sensitivity by alcohol intake, and questioned the use of insulin level as a surrogate for insulin sensitivity used in several studies.

In the light of the lively debate on the cardioprotective effects of alcohol, and several reports from Western countries showing an increase in alcohol consumption, this complex area needs further exploration. The aim of this study was therefore to investigate risk factors for newly diagnosed diabetes, especially the effect of alcohol, in a representative population-based sample of subjects aged 60 years in Stockholm County, Sweden.

Methods

From August 1997 to March 1999, every third man and woman living in Stockholm County who was born between 1 July 1937 and 31 June 1938 was invited to participate in a thorough health screening study. The participants underwent a physical examination that included measurements of height, weight, waist and hip as well as sagittal abdominal diameter (SAD). Systolic and diastolic blood pressures were measured in the sitting position after 5 min of rest and the mean values of two measurements were calculated. Fasting blood samples were taken and a comprehensive questionnaire was completed. The study was approved by the ethics committee at the Karolinska Institutet. The study participants all gave their written informed consent.

Subjects

Totally, 5460 subjects (2779 men and 2681 women) were invited to participate in the study, and in general the response rate was high. A total of 4232 individuals (78%) participated, 2039 men (73%) and 2193 women (82%). Blood glucose data was missing for four men and one woman, leaving 4227 individuals, 2035 men and 2192 women. Answers to alcohol questions were missing in 52 men and 59 women, thus 1973 men and 2133 women were included, for a total of 4106 subjects. Of these, 186 had known diabetes diagnosis (113 men, 5.6%, and 73 women, 3.3%). Thus, 3920 subjects free of known diabetes remained, 1860 men and 2060 women, to estimate the association between alcohol intake and newly diagnosed diabetes.

Life style factors

Living conditions were defined as living in an apartment (yes/no). An employment variable was defined according to working status (yes, full or part-time/no). The education level was defined as (1) lower or no education/compulsory school, (2) secondary/12-year school, and (3) university or college. Smoking habits were coded as current daily smoker, former smoker or never smoker. Physical activity during leisure time in the past year was asked for and grouped into the following categories: (1) inactive, (2) light activity at least 2 h/week, (3) moderate activity one to two times/week, and (4) intensive activity ≥3 times/week. Categories 1 and 2 were classified as ''inactive'' and categories 3 and 4 were classified as ''active''. Dietary intake was measured using a food frequency questionnaire that included 17 questions each with four alternative answers. The questions used concerned the intake of fruit, vegetables (other than lettuce, tomato or cucumber), fish, fried potatoes (or potatoes au gratin), and sausage/bacon.