
CARDIOVASCULAR RISK FACTORS AND PREVALENCE
OF CORONARY HEART DISEASE IN TYPE 2
(NON-INSULIN-DEPENDENT) DIABETES

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The relationship between cardiovascular risk factors and the prevalence of coronary heart disease was examined in 152 Type 2 diabetic patients (65 men, 87 women) aged 35-54 years and in 105 randomly selected control subjects (46 men, 59 women). Coronary heart disease, defined by symptoms and ECG abnormalities, was 1.2 times higher in male and 3.4 times higher in female diabetic patients than in the controls. In logistic regression analysis (including diabetes, age, body mass index, triglycerides, HDL-cholesterol, non-HDL-cholesterol and hypertension) diabetes showed an independent, significant association to coronary heart disease in women, whereas hypertension was independently related to coronary heart disease in men.

INTRODUCTION

Coronary heart disease (CHD) is more common in diabetic than in non-diabetic subjects (10). Several studies indicate that the excessive occurrence of CHD among diabetics cannot be explained by cardiovascular risk factors alone (3, 5). The aim of the present study was to investigate factors related to the prevalence of CHD in Type 2 diabetes.

MATERIALS AND METHODS

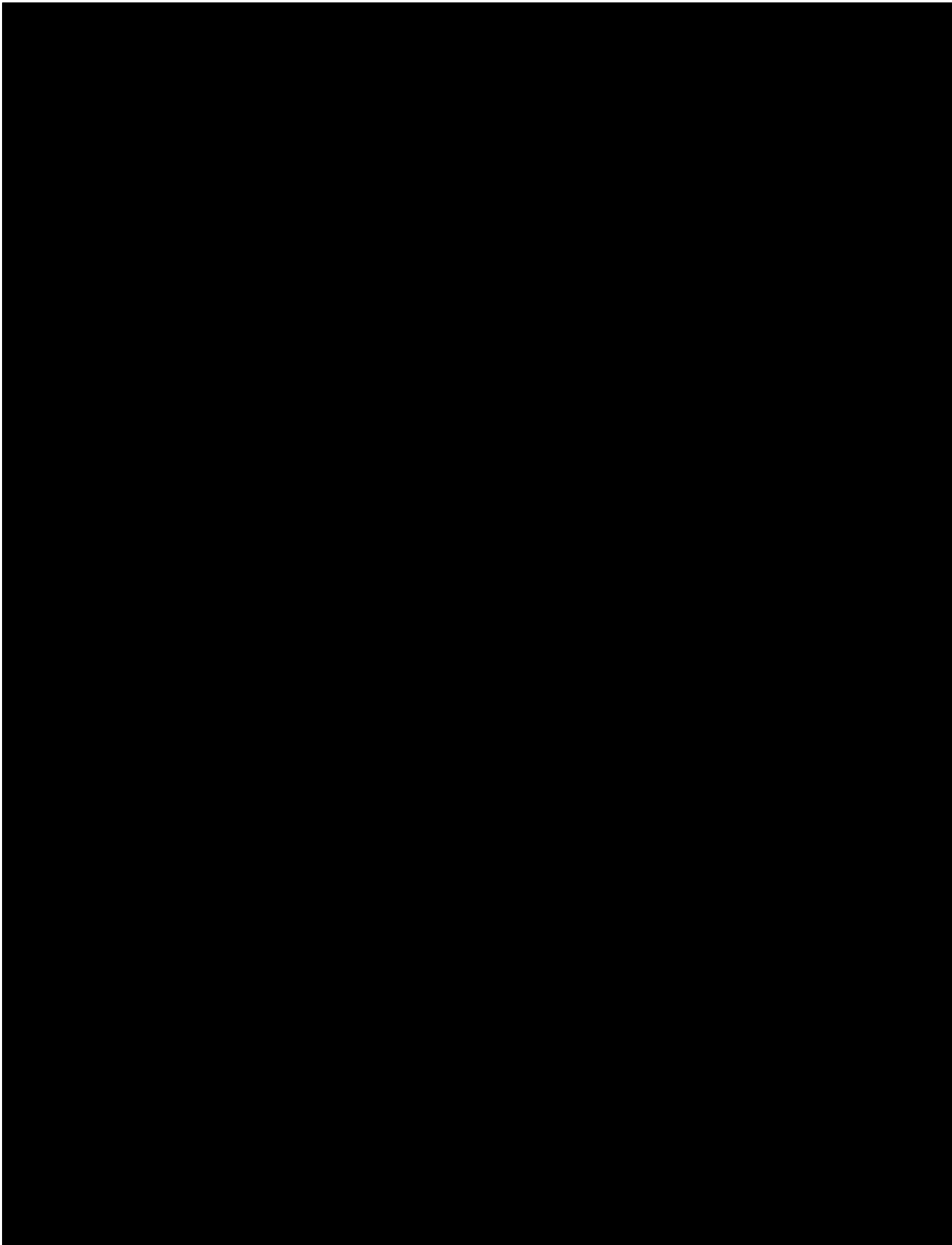
The investigation was performed in Kragujevac, a town in Yugoslavia with approximately 120,000 inhabitants.

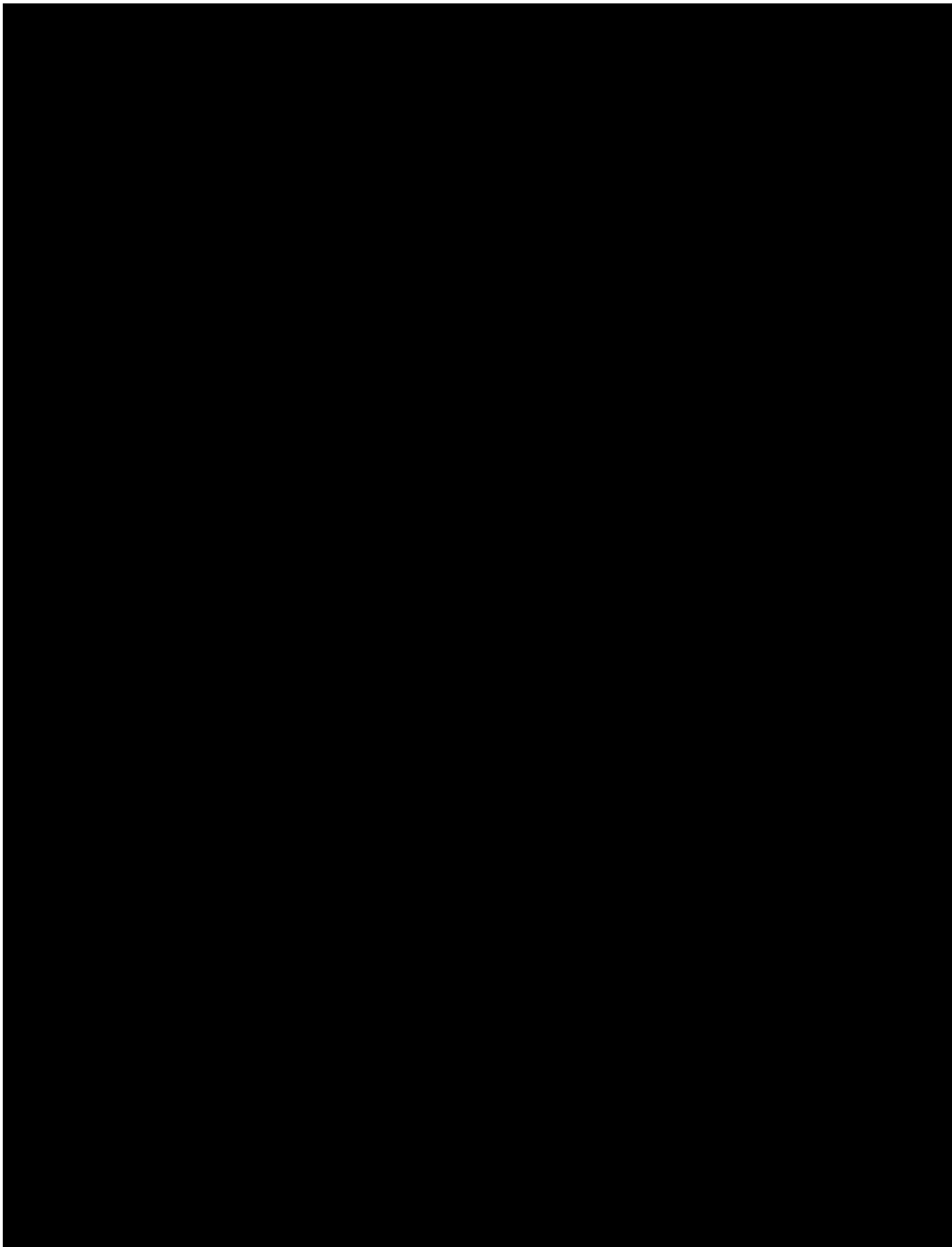
The diabetic group consisted of Type 2 diabetic patients, aged 35-54 years. They had been previously identified, after self-reporting, and registered by the health service of the study area. Of 167 registered diabetics, three changed place of residence, two were absent during the course of the study and eleven refused to participate. Thus, 152 subjects (65 men, 87 women) were included in the study. All of them fulfilled WHO criteria for the diagnosis of diabetes (21).

Controls were randomly selected from the population register of the study area, taking into account the age and sex distribution of the diabetic cases. Of 130 subjects originally chosen, five had diabetes, two had impaired glucose tolerance and eighteen refused to participate in the study. Thus the final control group consisted of 105 subjects (46 men, 59 women).

The mean age \pm SD for male diabetic subjects was 49.7 ± 5.2 years, for male control subjects it was

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The prevalence of hypertension was significantly increased in both sexes of diabetic subjects.

The prevalence of coronary heart disease was higher in both sexes of diabetic subjects, but the diabetic/control difference was statistically significant only for women.

According to the results presented in Table 2, there were no significant differences of serum lipoproteins and body mass index between subjects with and without coronary heart disease, either in diabetic or control subjects.

The prevalence of CHD in diabetics and controls of both sexes was higher in subjects with hypertension than in those without, but the difference was not significant (Table 3). Smoking did not show a significant association with CHD, either in diabetics or in the controls (Table 3).

Logistic regression analyses were carried out separately for men and women, combining diabetic and control subjects in order to examine the independent

effect of diabetes from other cardiovascular risk factors on the occurrence of coronary heart disease. In men, only hypertension and in women, only diabetes were related significantly to coronary heart disease (Table 4).

Logistic regression analyses carried out in male and female diabetic subjects did not show significant relationships between any of the cardiovascular risk factors and coronary heart disease.

DISCUSSION

As expected, in this study cardiovascular risk factors, including obesity, hypertension, smoking and lipoprotein abnormalities, were significantly more frequent in diabetics of both sexes compared with control subjects, which is in agreement with several other studies (1, 13, 17, 19).

It is considered that defects in lipoprotein metabolism play a pivotal role in the pathogenesis of

The absence of an association between any of the cardiovascular risk factors and CHD in diabetics of both sexes could be explained by the fact that these factors were present in the majority of diabetic patients - in each of our diabetic subjects at least one lipoprotein abnormality was found.

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REFERENCES

1. *Abrams J.J., Ginsberg H. and Grundy S.M.* (1982): Metabolism of cholesterol and plasma triglycerides in non-ketonic diabetes mellitus - *Diabetes* 31: 903-910.
2. *Blackburn H. and Keys A.* (1960): The electrocardiogram in population studies. A classification system - *Circulation* 21: 1160-1175.
3. *Fontbonne A., Eschwege E., Cambien F., Richard J.D., Ducimetiere P., Thibault N., Warnet J.M., Claude J.R. and Rosselin G.E.* (1989): Hypertriglyceridemia as a risk factor of coronary heart disease mortality in subjects with impaired glucose tolerance or diabetes - *Diabetologia* 32: 300-304.
4. *Fuller J.H., Shipley M.J., Rose G., Jarrett R.J. and Keen H.* (1983): Mortality from coronary heart disease and stroke in relation to degree of glycaemia: the Whitehall study - *Br. Med. J.* 2: 867-870.
5. *Heyden S., Heiss G., Bartel A.G. and Hames C.G.* (1980): Sex differences in coronary mortality among diabetics in Evans county, Georgia - *J. Chronic. Dis.* 33: 265-273.
6. *Jarrett R.J., Keen H. and Grabanscas V.* (1979): The WHO Multinational study of vascular disease in diabetes. 1. General description - *Diabetes Care* 2: 175-186.
7. *Kannel W.B. and Mc Gee D.L.* (1979): Diabetes and cardiovascular risk factors: the Framingham Study - *Circulation* 69: 8-13.
8. *Kelsey J.L., Thompson W.D. and Evans A.S.* (1986): *Methods in Observational Epidemiology* - Oxford University Press - New York - Oxford.
9. *Laakso M., Voutilainen E., Pyorala K. and Sarlund H.* (1984): Association of low serum HDL-cholesterol and HDL-cholesterol with coronary heart disease in non-insulin-dependent diabetes - *Diabetologia* 27: 301 A.
10. *Mann J.I., Pyorala K. and Teischer A. (eds.)* (1983): *Diabetes in epidemiological perspectives* - Churchill Livingstone - Edinburgh.
11. *Lipid Research Clinics Program* (1974): *Manual of Laboratory Operation* - Vol. I - DHEW Publication.

12. *Miller G.J.* (1989): High-density lipoproteins and atherosclerosis - *Ann. Rev. Med.* 31: 97-108.
13. *Mueller-Wieland D., Krone W. and Frahm H.* (1989): Cardiovascular risk factors in diabetes mellitus - *Diabetologia Croatica* 18: 105-110.
14. *Oster J.R., Materson B.J. and Epstein M.* (1990): Diabetes mellitus and hypertension - *Cardiovascular risk factors* 1: 25-46.
15. *Reunanen A., Laakso M. and Pyorala K.* (1983): Cardiovascular and coronary heart disease mortality of diabetics and non-diabetics; impact of risk factors - *Am. Coll. Cardiol.* 2: 600 A.
16. *Rose G.A. and Blackburn H.* (1968): Cardiovascular survey methods - WHO monograph series No. 56 - WHO - Geneva.
17. *Schumacher M.C. and Smith K.R.* (1988): Diabetes in Utah among adults: Interaction between diabetes and other risk factors for microvascular and macrovascular complications - *AJPH* 78: 1195-1201.
18. *The Lipid Research Clinics Program* (1984): The Lipid Research Clinics coronary primary prevention trial results. I. Reduction in the incidence of coronary heart disease - *JAMA* 251: 351-346.
19. *Uusitupa M., Siitonen O., Pyorala K., Aro A., Hersio K., Penttila I. and Voutilainen E.* (1985): The relationship of cardiovascular risk factors to the prevalence of coronary heart disease in newly diagnosed Type 2 non-insulin-dependent diabetes - *Diabetologia* 28: 653-659.
20. *West K.M., Ahuja M.M.S., Bennett P.H., Cryzyk A., Mateo De Acosta O., Fuller J.H., Grab B., Grabuskas V., Jarrett R.J., Kosaka K., Keen H., Krolewski A.S., Miki E., Schliack V., Teuscher A., Watkins P.J. and Stober J.A.* (1983): The role of circulating glucose and triglyceride concentration and their interaction with other risk factors as determinants of arterial disease in nine diabetic population samples from the WHO multinational study - *Diabetes Care* 6: 361-369.
21. *WHO Expert Committee* (1980): On Diabetes Mellitus. Second report - Technical Report Series No. 646 - WHO - Geneva.