

A comparative study of coronary and contributory risk factors in rural and urban type 2 diabetics

Jha N¹

1Asst. Lecturer, Department of Pharmacology, Kathmandu Medical College

Abstract

A prospective study of various coronary and contributory risk factors in urban and rural diabetic population is presented. For the coronary risk factors, smoking prevalence was high for urban diabetics (27%), also high TC levels (57%), and low levels of HDL cholesterol (17%) were comparatively greater in urban diabetics. Prevalence of hypertension was higher, (40%) in rural diabetics. High LDL levels were ($>130\text{mg/dl}$) were observed in 20% of rural subjects and 47% of urban diabetics. High TG levels (34%) were seen in rural diabetics. 54% of urban diabetics were centrally obese and 57% were obese from the rural study site. From this study, it was seen that, illiteracy percentage was found to be higher in rural subjects. Also, greater number of people (70%) were in inadequate status for the needed patient awareness. 77% of patients belonging to the rural study area were found to be unaware for the hypoglycaemia. Low patient compliance was seen in urban diabetics as compared to their rural counterparts, and 34% of patients belonging to both study sites were found to have no knowledge for diabetic complications. High total cholesterol was found to be the commonest lipid profile abnormality in this study. Second commonest lipid abnormality was high LDL levels. Low HDL cholesterol was found to be more commonly in patients of age > 60 years than < 60 years (21.42% vs. 18.18%). More female patients were overweight and obese as compared to male (33.33% vs. 19.23%). A Large population of diabetics was found to have a sedentary lifestyle. Rural patients were progressing towards more coronary risk factors as compared to the urban ones, mainly with the lipid profile abnormalities. Although our type 2 diabetic patients share similar coronary risk factors as compared to diabetic patients from different countries, our type 2 patients have got high prevalence of hypertension. Male diabetics had high prevalence of smoking habits.

Keywords: Coronary risk factors, Contributory risk factors, Lipid profile abnormalities

Diabetes mellitus, especially type-2 diabetes mellitus is a major global health problem. An estimated 30 million people worldwide had diabetes in 1985. By 1995, this number had shot up to 135 million. Now, WHO predicts a rise to an alarming 300 million by 2025¹. It is increasing worldwide in an epidemic form including Nepal². More than 95% of American and Indian populations with diabetes have type 2 diabetes^{3, 4}. It accounts for between 85-90% of all diabetes. The vast majority of type 2 diabetes occurs in the middle or old age and at least 4% of people in their 60s have diabetes. Diabetes is a major source of morbidity, mortality and economic cost to society.

The leading morbid cause for diabetes fatality is Diabetic dyslipidemia. As shown in the United Kingdom Prospective Diabetes study (UKPDS)⁵. As shown by the diabetes newsletter⁶, 4 key features of diabetic dyslipidemia are: 1) hypertriglyceridemia, 2) a high proportion of small dense low density lipoproteins (LDL), 3) low high density lipoprotein cholesterol (HDL), post prandial lipemia.

In UKPDS study⁷ an increased concentration of low-density lipoprotein cholesterol at baseline was a major risk factor for coronary disease. Decreased concentration of high-density lipoprotein cholesterol was an independent risk factor for coronary artery disease (CAD) in this study. Both the Paris Prospective study,⁸ and WHO Multinational Trial,⁹ have shown that hypertriglyceridemia is a significant predictor of subsequent cardiovascular mortality in persons with diabetes. According to prospective data,¹⁰ hypertriglyceridemia also appears to be a major coronary risk factor in men with abnormal glucose tolerance. In the multiple risk factor intervention trial,¹¹ which included over 5000 people with diabetes, a direct relationship between cardiovascular mortality and serum cholesterol levels was seen in the diabetic group. Similarly the other important factor is hypertension, which is 1.5-2 times

Correspondence

Ms. Nisha Jha
Dept. of Pharmacology, Kathmandu Medical College, Sinamangal, KTM
Email: nisha_venus@hotmail.com

greater in diabetes mellitus compared to non diabetic individuals¹². Prevalence rate varies between 40-70%. In a study,¹³ where correlation between hypertension and related risk factors has been studied in 733 type-2 diabetic patients, hypertension was more frequent in women (65%) than in men (50%). Hypertensive patients showed older age and greater Body Mass Index (BMI) than normotensives. In both sexes, hypertension was independently correlated with age, BMI, increased albumin excretion, triglycerides. The strongest correlation was with the family history of hypertension. On the contrary, there was no correlation between hypertension and WHR. There is little data on smoking in the diabetic population and what does exist tends to be conflicting. In the study done by Kong C, Nimmo et al.^{14, 15} (South Africa, 1996) 27% of type 2 diabetic patients were smokers. Cigarette smoking is an important factor promoting coronary arteriosclerosis.

Aims and Objectives

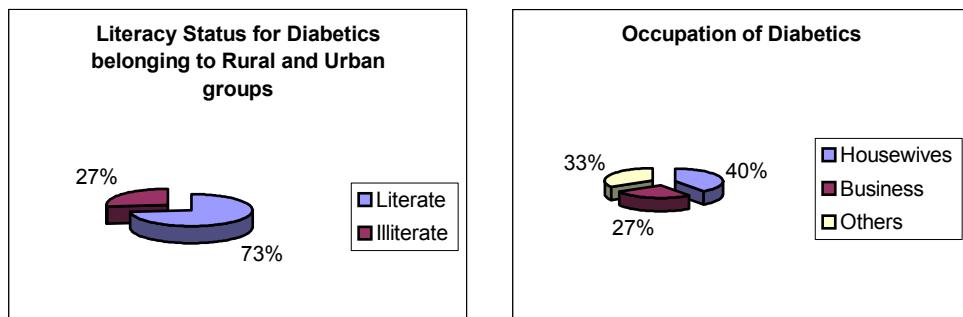
1. To assess the various coronary risk factors for type 2 diabetic patients regarding the various long-term micro vascular and macro vascular complications by the use of laboratory investigations.
2. To assess the lipid profile abnormalities and analyze the risk factors for the patients.
3. To analyze the contributory risk factors.
4. To promote patient compliance.

Methodology

This study was a prospective observational follow-up study, designed in two sites, rural and urban areas comprising of 60 patients who were already diagnosed as NIDDM patients and this study was undertaken in Dhulikhel community and Kathmandu's Diabetes clinic from September 2002 to March 2003. Sampling method used was convenient sampling method and the subjects were visited for their three consecutive follow-ups in a one-month time period gap. Patients were interviewed individually according to a structured and pretested questionnaire and their glycemic levels along with other laboratory investigations for lipid profile abnormalities were observed using laboratory techniques. Evaluation of coronary risk factors was done with major emphasis to smoking, hypertension and lipid profile abnormalities, generalized and central obesity, whereas analysis for contributory risk factors were done by assessing various parameters such as awareness of the patients, knowledge of the side effects, awareness for the hypoglycaemic status, knowledge for the diabetic complications Data were tabulated and entered in Microsoft Excel. Analysis of the data was done with the help of Statistical Package SPSS 10.0.1 Descriptive statistics of the variables were carried out. The different parameters were compared for the different risk parameters.

Results

Fig. 1 The job distribution and literacy of the subjects belonging to both study sites



Coronary Risk Factors

Fig. 2 Prevalence of Hypertension in Urban and Rural Diabetic Subjects

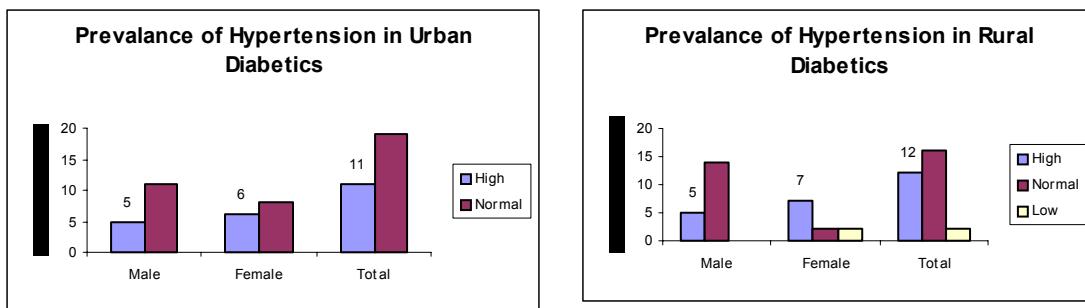


Table 1: Smoking status for both groups of diabetics as a measure of coronary risk factors.

	Smokers	Non-Smokers
Urban	8(27%)	22(73%)
Rural	7(23%)	23(76%)

Table 2: Showing high levels of TC in both groups of diabetics.

TC	>200mg/dl	<200mg/dl
Urban	17(57%)	13(43%)
Rural	10(33%)	0

Maximum numbers of subjects belonging to urban site were having this type of abnormality.

Table 3: Showing different levels of HDL cholesterol in both groups of subjects.

HDL Cholesterol	Low <35mg/dl	Borderline 35-45mg/dl	Normal >45mg/dl
Urban	5(17%)	11(37%)	14(47%)
Rural	7(24%)	9(29%)	14(47%)

Low HDL cholesterol was observed more in rural study participants.

Table 4: Showing levels of LDL cholesterol in urban and rural diabetics.

LDL Cholesterol	<100mg/dl	100-129mg/dl	>130mg/dl (high)
Urban	9(29%)	7(23%)	14(47%)
Rural	13(43%)	10(33%)	6(20%)

High LDL cholesterol was observed in urban diabetics.

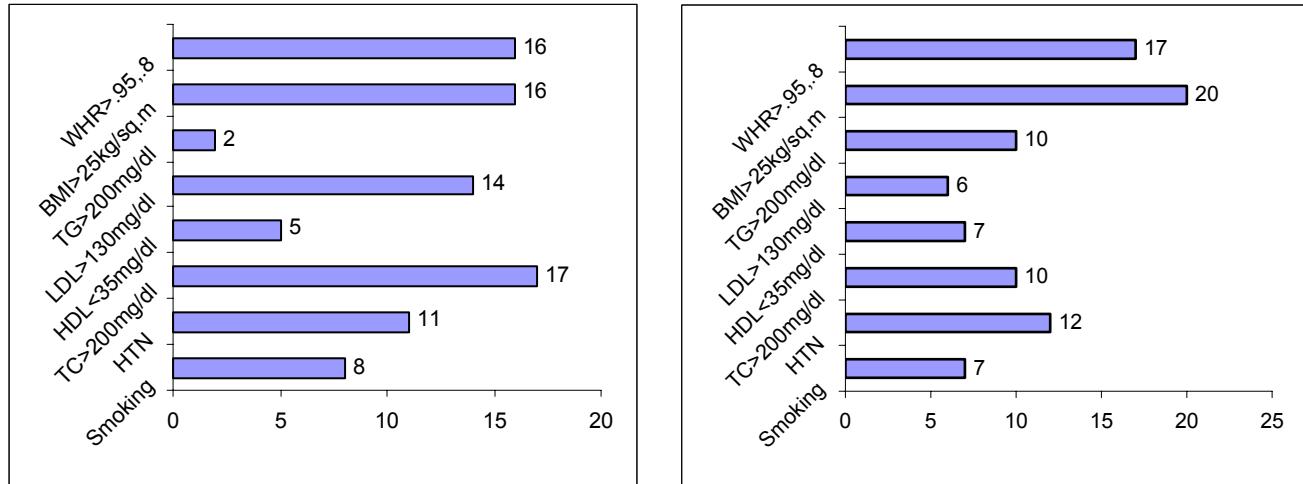
Table 5: Showing high, borderline and desirable levels of triglycerides in the study participants

TG	High (>400)	Borderline(200-399)	Desirable (<200)
Urban	0	2(7%)	28(93%)
Rural	0	10(33%)	20(66%)

Borderline TG was seen in maximum number of rural diabetics.

1.5 Comparison of coronary risk factors for the urban and rural diabetic population

Fig.3: Coronary Risk factors for the Urban and Rural Diabetic Population respectively.



1.6 Analysis of the contributory risk factors for the patient status

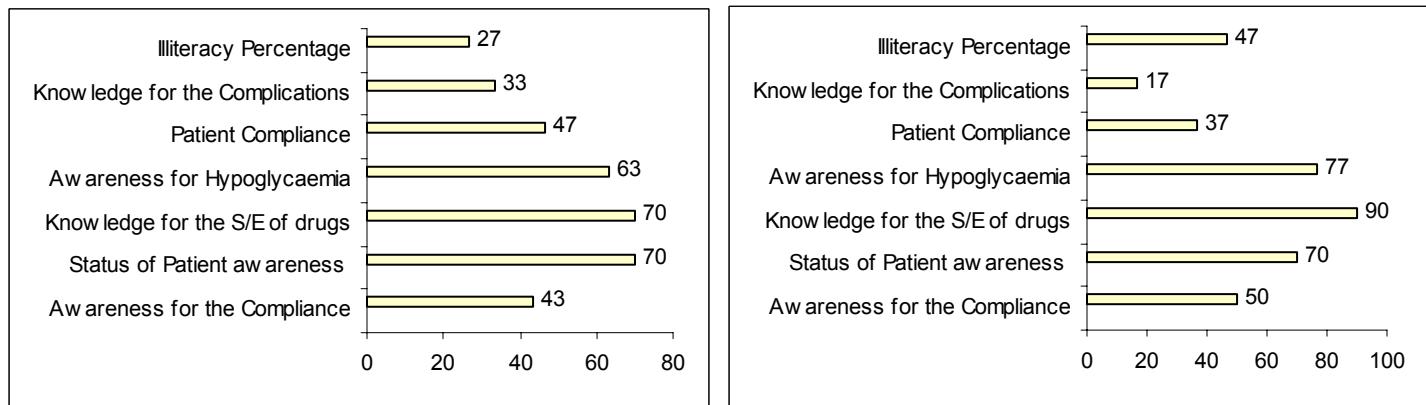


Fig.4.18.2,Contributory risk factors for urban and rural patient status respectively.

Discussion

This study showed the prevalence of coronary risk factors in both the group of diabetic subjects. Although our type 2 diabetics share similar coronary risk factors as compared to diabetic patients of other different countries, our type 2 diabetic patients have high prevalence of hypertension. Our male patients also have high smoking habits.

Coronary risk factors for the urban and rural group of study participants were as follows; smoking prevalence was seen in 27% of the patients belonging to the urban site and 2% in rural subjects. Hypertension was seen in 37% of urban diabetics and 40% in rural diabetic population among the modifiable coronary risk factors. High levels of total

cholesterol level ($\geq 200\text{mg/dl}$) were seen in 57% of urban subjects and 34% in rural subjects. Low levels of HDL Cholesterol ($\leq 35\text{mg/dl}$) were seen in 17% of urban patients and 24% of the rural diabetic patients. High LDL levels ($\geq 130\text{mg/dl}$) were observed in 47% of urban patients and 20% of rural diabetic subjects. Borderline triglycerides levels ($\geq 200\text{mg/dl}$) were seen in 7% of urban study participants and 33% of rural subjects. For the central obesity, 54% of urban diabetics were found to be centrally obese, i.e., abdominal obesity and that for the rural subjects was seen in 57% of subjects. Similarly, for the generalized obesity, 54% of subjects were found to be obese in urban part and 66% were obese from the rural study site.

Consequences of obesity are many, it predisposes to hypertension, coronary artery disease, and lipid abnormalities. It leads to diastolic dysfunction of heart and predisposes the individuals to sudden death. Comparatively rural area patients were more progressing towards the coronary risk factors, having lipid profile abnormalities, as seen from the observations above, rural patients were having lower HDL, borderline TG, more generalized and centrally obese and also hypertensives than to the urban diabetics.

Low HDL levels were seen in 17% of our patients, which seems to be a bit higher than the prevalence of 13% observed by Bruno G et al. in 2000. The prevalence observed by Meenu Walia et al. 1999¹⁶ was 42% that was higher than this study and this could be due to the reason that her cut off value of HDL Cholesterol was ≤ 40 mg/dl. This study also showed that low HDL is more common in the age group >60 years (21%) than age than in the age group of <60 years.

In this study, high cholesterol level (>200 mg/dl) was observed in 17 patients among 30 patients (57%), in urban group of diabetics, which was not a matter to be ignored. Similarly, 10 patients (33%) of rural diabetics had the high levels of cholesterol. The prevalence is higher, i.e., 57% in our urban type 2 diabetic patients than observed (21%) by Fernando DJ et al. 1993, and Sribaddana et al. 1994, in Srilankan type 2 patients. Similar prevalence of hpercholesterolemia as this study was observed by Meenu Walia et al.1999¹⁶ in 43.6% of type 2 diabetic patients of Johannesburg.

About 11 patients (36.66%) were having hypertension in urban group, whereas 12 patients (40%) belonging to the rural group were found to be currently hypertensives. Thus altogether 38.33% of patients were hypertensives from both the groups.

Donney R et al. 1997¹⁷ showed a similar kind of prevalence of hypertension in 69% of Australian type 2 diabetics. Similarly, WB Moore et al. 1998¹⁸ showed the prevalence of (78% and 55%) in referral clinics and primary care clinic respectively. Bog Hansen et al. 1998¹⁹ showed prevalence of 57% in Swedish type 2 diabetic patients (BP $>$ 140/80 mmHG), where as Meenu Walia et al.1999¹⁶ observed hypertension in 31% of Indian type 2 diabetic patients. ACE Inhibitor, Enalapril was the commonly prescribed drug found in all 38% patients.

Discussion for Controlling Factors for both groups of Patients

For both the groups of diabetics, different factors may be responsible as the contributory factors,

directly or indirectly influencing the patient status. The illiteracy percentage for the urban group was found to be in 27% of patients, where as in rural group, the percentage was found to be 47%. Similarly, low awareness for the compliance for the urban subjects was found to be 44% and that for the rural group was 50%. This may be one of the reasons that the rural groups of patients were comparatively less aware about the possible long-term complications of diabetes and thus the prevention of any unwanted complications. Inadequate status for the patient awareness was seen in 70% of urban patients, and 44% in the rural group. Comparatively, inadequate status of patient awareness was found to be higher in urban group of subjects, which may be due to the reason that the patient awareness for the self-management education, attitude and health beliefs differs which contributes and leads to the different approach for this group of subjects. Some patients keep on changing their consultants when their glycemic levels do not meet to the specified levels. Also lowering of adherence with growing age is quite common in chronic disease like diabetes. So these may be the thing that makes the low awareness and lower compliance. The inadequate knowledge for the side effect of the anti diabetic drugs was found in 70% of the urban subjects where as from the rural group, it was seen in 47% of subjects. The reason may be that, people from urban site are not much concerned with the dosages and the dosing frequencies as they get the access for the medical facility very conveniently as compared to the rural ones, so they might not bother more about the side effects and all, where as rural ones are more concerned with the drugs, because of the disliking for taking medicines which also takes account for the economic burden for them. The unawareness for the hypoglycaemic state was found in 64% of urban population, and in 77% of rural population. Rural area patients are not exposed adequately for acute as well as the long-term complications of diabetes and they simply don't know about hypoglycaemia as compared to the urban diabetics. Though the numeric difference for unawareness for the hypoglycaemia is not more for both groups, but they may not know this condition because of the lack of counselling for diabetics, there should be a proper counselling for them so that they can manage their disease more safely. Similarly, the next factor which is the low patient compliance was seen in 47% of the urban diabetics, and 37% of the rural diabetics, which may be due to the busy schedule of the patients, and their busy lifestyles and low adherence to medications in chronic diseases. Besides all these factors, the knowledge for the diabetic complications was seen only in 34% of urban as well as rural

diabetics. Believing to the truth that the one, who knows more about the management of disease, lives the longest! seems to be true for both the group of diabetics, thus it is needed that patients should be aware about the disease management and its short term and long term complications, so that they can live a better life. Thus the patient compliance can be improved by the knowledge of all the possible complications.

Recommendation

1. A balance between government, community and individual action is necessary. For example, non-governmental organizations, local groups the media and others should support community action. At the same time, individuals should be empowered and encouraged to make positive, life enhancing health decisions for themselves on matters such as excessive alcohol consumption, smoking, obesity, tobacco use, unhealthy diet and sedentary lifestyles.
2. Early screening of coronary risk factors and its management has to be recommended for overall management of diabetic patients.
3. Cigarette smoking attenuates whatever benefits accrued from modifying risk factors therefore; cessation of smoking should be strongly advised to all diabetic patients.
4. Hypertension can accelerate other complications of diabetes, particularly cardiovascular disease and nephropathy. Early identification by regular check-up during hospital visit and treatment is mandatory in all diabetic subjects.
5. Because of additive cardiovascular risk of hyperglycaemia and hyperlipidemia, lipid abnormalities should be aggressively detected and treated as a part of comprehensive diabetic care.

Acknowledgement

I am extremely grateful to Dr. D. L. Singh, FRCP (Edin), Consultant Physician, Department of Medicine, Bir Hospital for his kind Co-operation and constructive criticism through out the thesis period.

I extend my sincere thanks to Dr. Madhur Dev Bhatrai, M.D. FRCP, Physician and Postgraduate Teacher of Bir Hospital for his expert guidance for the preparation of thesis and for constantly encouraging me throughout the thesis work.

I am very grateful to Dr. Pradeep Krishna Shrestha, MBBS, MD of TU Teaching Hospital for his constant

inspiration and cooperation to complete this work. Last but not least, I do acknowledge the kind co-operation of all those who have been my subjects, as they have enabled me to complete this study and materialize this work.

References

1. Diabetes Mellitus Biostatistics. 1998.
2. Madhur Dev Bhatrai, Bir Hospital, Diabetes in Nepal; Diabetes in Middle East, Eastern Mediterranean & South Asia (DIMEMSA), Second Conference, 2000.
3. Ramchandran A, Snehalata C, Dharmaraj D. M. Prevalence of glucose intolerance in Asian Indians: urban rural difference and significance of upper body adiposity. *Diabetes Care* 199; 215:1348-1355.
4. Zimmer P. NIDDM an Epidemiological overview. *Diabetologia* 1982; 22: 399-411.
5. UK Prospective Diabetes Study (UKPDS) Group. Intensive blood glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients in insulin dependent diabetes mellitus. *N Engl J Med* 1993;329 (14): 977-86.
6. Diabetes newsletter, University of Medicine and Dentistry of New Jersey, published by UMDNJ-Center for continuing Education.
7. Turner RC, Millins H, Neil H A W, Stratton I M. Risk Factors for coronary artery disease in NIDDM: United Kingdom prospective diabetes study (UKPDS:23) *BMJ* 1998; 316: 823-828
8. Fontbonne A, Eschwege E, Cambien F. Hypertriglyceridemia as a risk factor of coronary heart disease mortality in heart patients with impaired glucose tolerance or diabetes: results from 11-year follow-up the Paris prospective study *Diabetologia* 1989; 32 (5): 300-4.
9. Alberti KG, Zimmet PZ for a WHO consultation (1999) Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus. World Health Organization, Geneva.
10. Taskinen MR. Qualitative and quantitative lipoprotein abnormalities in diabetes mellitus. 1992; 41 (2): 12-17.
11. West KM, Ahuja MMS, Bennet PH. The role of circulating glucose and triglyceride concentrations and their interactions with other risk factors as determinants of arterial disease in nine diabetic samples from the

- WHO multinational study Diabetes Care 1983; 6: 361-9.
- 12. Simonson DC. Etiology and prevalence of hypertension in diabetic patients. Diabetes Care 1998; 11:821-827.
 - 13. Turner RC, Millins H, Neil H A W, Stratton I M. Risk Factors for coronary artery disease in NIDDM: United Kingdom prospective diabetes study (UKPDS:23) BMJ 1998; 316: 823-828
 - 14. Steenland, K: Passive smoking and risk of heart disease. JAMA 1992;267:94
 - 15. Kong C, Nimmo L, et al. Smoking is associated with increased hepatic lipase activity, insulin resistance, dyslipidemia and early Atherosclerosis in type 2 diabetes mellitus. Atherosclerosis 2001; 156(2) 373-8
 - 16. Meenu Walia, A. K Agrawal, et al. Prevalence of coronary risk factors in NIDDM diabetics. JAPI 1999; 47(11): 1015-1055.
 - 17. Donnelly R, et al.. Detection and treatment of hypertension in patients with non-insulin dependent diabetes mellitus: does the 'rule of halves' apply to a diabetic population? Diabetes Res Clin Pract 1997; 37(1): 35-40).
 - 18. W V Moore, D Fredickson et al. Prevalence of hypertension in patients with type 2 diabetes mellitus in referral vs. primary care clinics, Journal of diabetes and it's complications 1998; 12 (6): 302-306.
 - 19. Bog-Hansen E, Lindabad U, et al. risk factors clustering in patients with hypertension and non-insulin dependent diabetes mellitus. The Skaraborg Hypertension project. J. Intern Med 1998; 243(3): 223-32.