Cardiovascular Disease Risk Factors in Post-Menopausal Women in West Anatolia

A Rural Region Prevalence Study

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SUMMARY

Cardiovascular risk factors are important causes of morbidity and mortality in postmenopausal women. The aim of this cross-sectional study was to evaluate the cardiovascular risk factors in 207 postmenopausal Turkish women over 45 years old in a rural district of West Anatolia, Manisa Muradiye district.

A questionnaire on socioeconomic and sociodemographic characteristics was conducted in the women followed by the measurement of blood pressure, fasting blood glucose, cholesterol levels, and waist-hip ratio along with an electrocardiogram (ECG). The European Cardiology Society risk index was used for cardiovascular risk evaluation.

The results showed that 86% percent of the women will be carrying more than a 5% probability of developing a cardiovascular risk in the next 10 years. Moreover, the results proved 7% of the women are at high risk for a cardiovascular condition. Hypertension, hypercholesterolemia, and impaired glucose tolerance, were observed in 62%, 35.3%, and 13.5% of the women, respectively. Seven percent had smoked for at least six months. Fourteen cases had complained of exercise angina and pathologic ECG signs were diagnosed in one-third of these 14 cases. The waist-hip ratio measured 0.8 or more in 66.2% of the cases, with a range of 68-147 cm (mean; 95.6 ± 11.55).

The results indicate that the risk of a cardiovascular condition developing is extremely high in postmenopausal West Anatolian women and increases with age. Moreover, the prevalence of hypertension increased with age and was very closely related with low socioeconomic levels. These hazardous cardiovascular disease risk factors should be considered as high priority health problems in rural and low socioeconomic areas of developing communities. Intervention to modify the cardiovascular risk factors should be included in routine primary health care programs. (Jpn Heart J 2004; 45: 119-131)

Key words: Cardiovascular risk factors, Menopause, Hypertension, Hypercholesterolemia, Diabetes mellitus

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CARDIOVASCULAR disease is the leading cause of mortality in Turkey and in the industrialized world.¹⁾ The findings of the Framingham Cohort Study, North Carolina, and MONICA studies revealed that age, hypertension, diabetes mellitus, dyslipidemia, obesity, body fat distribution, smoking, menopause, and physical inactivity are the major and minor risk factors of cardiovascular disease.²⁻⁵⁾

Coronary heart disease (CHD) risk factors are important causes of morbidity and mortality in postmenopausal women. The assessment and modification of risk factors in women were based on observational and randomised studies. Nevertheless, the results of cholesterol-lowering and hormone replacement therapies are based on isolated observational data. The cardioprotective effects of estrogen have been determined in a number of studies. Likewise, the difference in cardiovascular risk between women and men at early ages disappears gradually after menopause and becomes equal for both sexes after ten years.⁶⁻¹¹⁾ In this manner, cardiovascular diseases are considered to be the primary cause of mortality in postmenopausal women.

Although malnutrition in adults, lifestyle, and the high socioeconomic classes of developed countries were believed to be related to high cardiovascular risk, the lower socioeconomic classes are at greater risk of cardiovascular diseases because of the higher prevalences of smoking, hypertension, and obesity seen in these classes.¹²⁻¹⁶⁾ These risk factors have more negative effects on women than men.¹³⁻¹⁷⁾

According to the most important recent epidemiological investigation in the Turkish population, the TEKHARF study (Turkish Adults Risk Factors Study), hypertension was found to be a major risk predictor for coronary artery disease. For each 10 mmHg of increase in systolic blood pressure, the risk of coronary artery disease risk increases by 22%.¹⁸⁾ Hypertension prevalence was found to be very high in the Turkish population based on the TEKHARF study, and approximately six million Turkish women are affected. The prevalence of hypertension was 16% among adult women and the incidences in urban and rural areas were 15.7% and 17.0%, respectively. The highest prevalence was found in the Black Sea and Eastern Anatolia regions which are underprivileged areas of the country, while the lowest prevalence was observed in the Mediterranean and Southeast regions.¹⁸⁾

Smoking is the most common risk factor for cardiovascular disease in Turkey. Two-thirds of Turkish men are addicted to smoking and three-fourths of them have smoked at some point in their lives. The number of Turkish women who smoke is 3.9 million and the cardiovascular risk is 1.8 times greater than for nonsmokers. Smoking is more frequent among women in urban areas (31.4%) than in rural areas (13.2%) and the suburban districts (19.2%) of urban areas.¹⁹⁾

Total cholesterol levels are low in the Turkish population compared to industrialized countries and they have not increased for the last several decades. However, high triglyceride and low HDL (high density lipoprotein) levels reveal a higher coronary artery disease morbidity in the Turkish population. The prevalence of hypercholesterolemia was 25% in 1997.¹⁸⁾

Obesity is accepted as an independent risk factor of coronary artery disease.¹⁸⁾ The waist-hip ratio (WHR), an indicator of central or abdominal obesity, is a special risk criterion for coronary disease. The elevation of WHR in women has been found to be related to myocardial infarction, angina and stroke frequency, whereas it is not related with age, smoking, cholesterol level, triglycerides, systolic blood pressure, and body mass index. Based on the previous studies on risk prediction, WHR is more important than body mass index.²⁰⁻²³⁾ According to the TEKHARF study, the highest obesity prevalence is found in the Black Sea area (35.6%) and the lowest is observed in the Mediterranean (14.1%) region, while the highest WHR is found in the Black sea region and the lowest in the western (Egean) region of the country.¹⁸⁾

The objective of this study was to evaluate the prevalence of cardiovascular risk factors and their determinants in postmenopausal women in Manisa Muradiye, a rural district in Western Turkey.

METHODS

The study was conducted in May 2001 in the Muradiye district of Manisa province in the western part of Turkey. The total postmenopausal population living in the district was 965. A sample of 210 women was selected from the district health center records for this cross-sectional survey. There was a 78% probability of an expected event (at least one cardiovascular risk prevalence) frequency with 5% standard deviation (worst acceptable range) and a confidence interval of 95%. The sample population was identified by proportional cluster and systematic sampling methods. Two hundred and seven women agreed to participate in the study. Each cluster was composed of ten households. A target woman in the sample population who was not found at home at the first visit was visited recurrently until she was at home. Three women could not be found at the addresses at all. Women over 45 who menstruated during the preceding six months were included in the study.

The data were obtained using a sociodemographic questionnaire and a number of diagnostic and anthropometric measurements such as blood pressure, fasting plasma glucose (FPG), total blood cholesterol, electrocardiogram (ECG), and waist-hip ratio. In addition to these, the physical domain of the World Health Organization Quality of Life Instrument (WHOQOL-BREF) was applied to the

women.²⁴⁾ This domain is composed of seven questions which probe the subjective self-evaluations of the persons on the areas of pain, energy, mobility, sleep, daily activities, work capacity and dependence on medications. The higher the domain score yields, the better the physical quality of life. The possible score range was between 4 and 20.

The Cardiovascular Risk Score of the European Society of Cardiology, systolic blood pressure, total cholesterol level, impaired glucose tolerance, smoking, coronary artery disease based on ECG changes, hip-waist ratio, and osteoporosis were all considered as dependent variables. Age, marital and educational status, employment status of woman, number of children, family structure, personality, spouse job, income and expenditure balance, house possession, WHR, and WHOQOL physical domain scores were considered as independent variables.

The Cardiovascular Risk Classification of the European Society of Cardiology was used as the basic dependent variable in the study.²⁵⁾ This risk classification includes six components; age, sex, blood pressure, total cholesterol level, smoking, and diabetes, and estimates the exact probability of developing coronary artery disease in the next ten years. The scores categorized the risk as under 5; 5-10%; 10-20%; 20-40%, and 40% and over. Fasting blood glucose and total cholesterol levels were measured with an Accutrend mobile glucometer from a fingertip. Blood pressure was measured from the right arm in a seated position after ten minutes of rest with an Erka sphygmomanometer. Cases with high blood pressure were measured again after 5 minutes.

Fasting blood glucose over 126 mg/dL and symptoms of at least one of polyuria, polyphagia, and polydipsia were considered to be an indicator of impaired glucose tolerance. Hypercholesterolemia was accepted if fasting total cholesterol was over 200 mg/dL according to NCEP guidelines,²⁶⁾ and systolic blood pressure over 140 mmHg and diastolic blood pressure over 90 mmHg were considered to indicate essential hypertension based on JNC VI criteria.²⁷⁾ According to the recommendations of WHO, those who had smoked at least one cigarette per day for six months were accepted as being smokers.²⁸⁾ A waist-hip ratio over 0.8 is considered to be a risk factor. Left ventricular hypertrophy signs, left bundle branch block, ST depression, and T wave inversion were accepted as pathologic signs in ECGs.

Statistical analysis: SPSS-10.0 and EPI INFO-6.04 statistical programs were used in the analysis. Odds ratios were used as a risk estimate in univariate and multivariate analyses, whereas logistic regression was used in multivariate comparisons.

RESULTS

The average age of the subjects was 62.3 ± 9.9 . More than half of the women had had no formal education at all. Four out of ten women were living alone because of either being single, divorced, or widowed. Half of the women had four or more children and nearly all of them had been living in the same area for their entire life. One third of the women stated their income was inadequate to pay for household expenditures (Table I). Fourteen percent of the women were not under any risk of cardiovascular disease (under 5%), and nearly half of the cases were considered to be at moderate or high risk (10% or more) in the next 10 years as shown in Table II. The prevalence of cases at very high risk for CHD and who should be monitored carefully was 6.8%.

The distribution of the cardiovascular disease risk factor categories of the women are presented in Table III. Two thirds of the cases had a systolic blood pressure over the normal limit, and 62 of 81 hypertensive cases were being treated. Only four hypertensive cases had a family history of hypertension. The prevalence of hypercholesterolemia was considered to be 35% in the postmenopausal period. The average blood cholesterol level was determined to be 192 ± 36.01 mg/dL.

Seventeen of 207 cases had been diagnosed as having type 2 diabetes previously and the mean duration of diabetes was 5.68 ± 4.58 years. The average time from the last measurement of their fasting plasma glucose (FPG) was 3.7 ± 3.8 months. Together with 17 cases diagnosed previously, the prevalence of impaired

Table I. Distribution of Women According Socio-economic Variables

<i>n</i> = 207	<i>n</i> (%)
Age	mean: 62.3 ± 9.9
Education status	
No formal education	119 (57.5)
At least 5 years of education	80 (42.5)
Marital status	
Married	123 (59.4)
Living alone	84 (40.6)
Number of children	mean: 3.7 ± 1.9
Duration of living in the district (years)	mean: 32.4 ± 5.92
Balance of income and expenditure	
Income is higher than expenditure	140 (67.6)
Expenditures exceed income	67 (32.4)
Employment of spouse	
Employed	112 (54.1)
Unemployed	80 (45.9)
Total	207 (100.0)

Table II. Distribution of Subjects According to the Cardiovascular Risk Classification of the European Society of Cardiology

Risk category*	<i>n</i> (%)
Risk < 5% **	29 (14.0)
Risk 5-9%	81 (39.1)
Risk 10-19%	83 (40.1)
Risk 20-40%	14 (6.8)
Risk > 40%	0 (0.0)
TOTAL	207 (100.0)

* exact probability of having coronary artery disease in the next ten years, **no risk.

Table III. Prevalences of the Individual Cardiovascular Risk Factors

Risk factor	Risk Category	<i>n</i> (%)
Systolic blood pressure (mmHg)	139 mmHg and less	80 (38.6)
	140 mmHg and over	127 (61.4)
Total cholesterol	200 mg/dL and less	134 (64.7)
	200 mg/dL and over	73 (35.3)
Impaired glucose tolerance	Previously diagnosed	17 (8.2)
	Diagnosed during this study	11 (5.3)
	No diabetes	179 (86.5)
At least 6 months of smoking	Yes	14 (6.8)
	No	193 (93.2)
ECG pathology	Yes	67 (32.4)
	No	134 (64.7)
Total		207 (100.0)

glucose tolerance was estimated to be 13.5% (28/207) in the postmenopausal women. Eleven were diagnosed with impaired glucose tolerance during the study. The average FPG values measured in the total sample ($n = 207$), in the impaired glucose tolerance cases ($n = 28$), and previously diagnosed diabetics ($n = 17$) were 101.5 ± 47.4 mg/dL, 171 ± 74.5 mg/dL, and 170.1 ± 64.5 mg/dL, respectively. Only 6.8% of the cases had smoked at least one cigarette a day for six months or more. Approximately one-third of the cases were observed to have pathologic signs in the ECGs and fourteen of the cases had exercise-induced angina pectoris. The mean waist size of the cases was 95.6 ± 11.55 cm (minimum 68 cm and maximum 147 cm) and the mean hip size was 114.42 ± 12.67 cm (minimum 90 cm and maximum 197 cm). The mean WHR was 0.83 ± 0.067 and the prevalence of the cases with a WHR over 0.8 was 66.2% (137/207).

The World Health Organisation quality of life (WHOQOL) physical domain score was estimated to be 12 or lower in 15% of the cases, and 15 or over in 61

%. The minimum was measured to be 6.2 and the maximum 20.0, with an average of 15.5 ± 2.6 . Osteoporosis was diagnosed in only 3 cases, 2 of whom were being treated. None of the cases were treated with hormone replacement therapy.

The univariate analysis results between the independent variables and total risk of CHD or single risks are summarised in Table IV. The risks shown in bold numbers represent statistically significant ones. Women with an age over 50, living alone, with four or more children, or an unemployed spouse were considered to be at greater risk than their counterparts with respect to the total risk of CHD in the following ten years and for the risk of hypertension. On the other hand, hypercholesterolemia was considered to be a risk factor in women who were members of nuclear families compared with extended type families. Impaired glucose tolerance and waist-hip ratio were not affected by any of the variables in the postmenopausal women.

To avoid the potential confounding effects of independent variables on the dependent variables, multivariate analysis (logistic regression test) was performed (Table V). Two logistic regression models were established each for the-

Table IV. Univariate Analysis Between Independent Variables and Cardiovascular Risk Factors Demonstrated as Odds Ratios

Risk of	Total Risk**** (present/absent)	Hypertension	IGT***	Total Cholesterol	W/H ratio*** > 0.8
Aged of 50 years and over (reference: <50 years)	54.3* (18.0-161.2)**	4.7 (1.9-11.2)	0.67 (0.2-2.5)	2.07 (0.8-5.4)	1.41 (0.6-3.2)
No education (reference: At least primary school)	2.53 (1.13-5.67)	0.99 (0.57-1.76)	0.98 (0.44-2.20)	1.19 (0.67-2.13)	1.12 (0.62-2.00)
Living alone currently (reference: married)	11.53 (2.66-50.00)	1.91 (1.06-3.44)	0.66 (0.28-1.53)	1.23 (0.87-1.33)	1.04 (0.56-1.87)
Having 4 or more children (reference: 3 or less)	3.85 (1.57-9.47)	2.03 (1.15-3.58)	0.82 (0.37-1.82)	1.40 (0.79-2.49)	1.48 (0.83-2.64)
Introverted (reference: Extroverted)	0.95 (0.36-2.50)	0.99 (0.49-2.00)	1.87 (0.75-4.62)	0.63 (0.29-1.34)	0.46 (0.23-0.92)
Spouse unemployment (reference: Employed)	9.53 (2.17-41.84)	2.05 (1.11-3.80)	0.44 (0.18-1.10)	1.02 (0.56-1.86)	0.78 (0.42-1.44)
Negative balance of exp. and income (reference: High Income)	0.89 (0.39-2.05)	1.09 (0.60-1.98)	0.66 (0.27-1.64)	0.77 (0.42-1.44)	1.45 (0.77-2.73)
Nuclear family (reference: Extended family)	0.79 (0.30-2.08)	0.86 (0.45-1.67)	0.63 (0.26-1.49)	3.14 (1.43-6.90)	1.27 (0.66-2.47)
Living in urbanarea until she was 12 (reference: Living in rural regions)	1.09 (0.42-2.87)	0.52 (0.26-1.01)	0.75 (0.27-20.8)	1.03 (0.51-2.05)	1.19 (0.59-2.43)

* Odds Ratio ** 95% confidence interval, ***IGT = impaired glucose tolerance, W/H ratio = waist/hip ratio

**** Cardiovascular Risk Classification of the European Society of Cardiology.

Table V. Odds Ratios Extracted from Reduced Logistic Regression Models for Both Hypertension and Total Cardiovascular Risk as Dependent Variables

	Beta	<i>P</i>	Odds Ratio	95% CI
Hypertension				
Age 50 or over	1.09	0.03	2.9	1.1 - 8.1
Unemployed spouse	0.54	0.04	1.7	1.1 - 3.3
Total Risk*				
Age 50 or over	3.59	0.000	36.3	10.4 - 126.1
Living alone	1.52	0.06	4.6	0.9 - 22.7

* Cardiovascular Risk Classification of the European Society of Cardiology (risk probability of < 5% versus > 5% and over).

Cardiovascular Risk Classification of the European Society of Cardiology and Hypertension which were considered as dependent variables. The Cardiovascular Risk Classification of the European Society of Cardiology was transformed to dichotomous data type with a cut-off point of at least 5% risk probability.

Cases over 50 years old and with an unemployed husband were at risk when hypertension was considered as a dependent variable. According to the total risk index, the possibility of risk is considered as a dependent variable, and all of the single variables are related with age. As a result, the cumulative cardiovascular risk is not affected by any of the variables except age in these postmenopausal women. The WHOQOL physical health situation score was determined to be significantly high in the cases without risk compared with the cases with a risk ($P = 0.000$).

DISCUSSION

Coronary artery disease is the leading cause of death and disability among postmenopausal women. Based on the most important results of this study, 86% of the postmenopausal women living in Muradiye, a rural region in West Anatolia, Turkey, are considered to be at risk for cardiovascular disease in the next ten years. Two-thirds of the women are considered to be hypertensive, one-third hyperlipidemic, and one third to have pathologic ECG changes, when the risk components were analysed separately. The prevalence of the high risk women with a risk score over 20% is considered to be 6.8%, and their life styles and risk factors should be monitored effectively.⁸⁾ The prevalence of at least one cardiovascular risk factor was found to be 84% in our study, 78% in Portugal,²⁹⁾ and 80% in the United States.³⁰⁾

The results of the present study show that the Turkish rural postmenopausal female population had a hypertension prevalence of 62% according to JNC VI criteria (systolic blood pressure > 140 mmHg and/or diastolic blood pressure > 90 mmHg). The prevalence of hypertension in our study was higher than similar studies in the Turkish population with the same age group. According to the most important epidemiological study of the Turkish population, the TEKHARF study (Coronary Heart Diseases Risk Factors in Turkish Adults), hypertension is a major risk predictor for coronary artery disease. Based on this study, the prevalence of hypertension is considered to be 50% in the 50-59 age group, increases by about 10% per decade, and approximately six million Turkish women are affected. For each 10 mmHg increase in systolic blood pressure, coronary artery disease risk increases by 22%. The prevalence of hypertension is 16% among adult women and the prevalences in urban and rural areas are 15.7% and 17%, respectively.¹⁸⁻¹⁹⁾ This prevalence is 20% for women over 50 years old in Ankara and 36% in the 50-54 age group in Adana in the central region of Anatolia.¹⁾ Approximately 76% of hypertensive patients were taking medication at the time of baseline screening in our study.

A large number of epidemiological studies have shown that elevated concentrations of total cholesterol and LDL cholesterol are important risk factors for CHD in women.^{31,32)} In this study, the total cholesterol level was higher than 200 mg/dL in 35.3% of the women. Based on NCEP criteria, 29.7% of women and 21.6% of men had high blood cholesterol levels in the US.²⁶⁾ According to Canadian Heart Health Surveys, 42% of Canadian women aged 18 to 74 years had high blood cholesterol levels, and 27% of women were in the moderate risk group based on their total cholesterol levels (5.2 to 6.1 mmol/L).³³⁾ Mean total cholesterol level was 192 mg/dL in our study and 196 mg/dL in the TEKHARF study. The prevalence of hypercholesterolemia in the Turkish population was considered to be 25% in 1997 based on the TEKHARF study¹⁸⁾ and 35% in the postmenopausal period in our study. Therefore, the prevalence of hyperlipidemia found in this study can be considered to be similar to those reported for developed countries³⁴⁻³⁸⁾ and higher than that of the TEKHARF study.

The previously diagnosed prevalence of diabetes was 8.2% and together with the new cases diagnosed in this study (5.3%), the total diabetes mellitus prevalence was found to be 13.5%, which is not exceedingly low and is consistent with the previous field study results. A well designed prevalence study in a very close district³⁹⁾ indicated the type 2 diabetes prevalences were: 5.4% for women over 20 ; 13.3% for women aged between 50-64 and, 17.2% for women over 65. In another recent prevalence study conducted in 6 villages in the north-west part of Turkey, the prevalence of type 2 diabetes in women over 40 years old was 14.7%.⁴⁰⁾

The other important results of this study are that the risk index and waist-hip ratio (WHR) are only affected by age. The obesity prevalence is quite high in this study, but this is not an exceptional finding for Turkey since it is a country-wide situation: The mean WHR is identical with the results of a Turkish cohort study (TEKHARF). The mean WHR in the TEK HARF study and our study were very similar (0.83 ± 0.068 in the present study and 0.84 ± 0.086 in the TEK HARF study.^{18,40)}

More than one third of both women and men are current smokers in the European rural population.²⁹⁾ However, only 6.8% of the cases had smoked at least once a day for six months or more in our study population. Data on the prevalence of pathologic ECG patterns in the Turkish population are very rare. Approximately one-third of the cases were observed to have pathologic signs in the ECGs and fourteen of the cases had exercise-induced angina pectoris.

A high prevalence of hypertension is widely known in rural parts of Turkey. Different rural studies have revealed that the range of hypertension prevalence in women over 40 is between 51.1% and 69.4%.⁴²⁻⁴⁴⁾ Thus, this is not only seen in the Muradiye district. The prevalence of hypertension is affected by a low socioeconomic situation. We should mention that access to and utilization of health services are very low in the rural districts of our country. The inequality between urban and rural areas in access to health services was greater in the early 1960s than now. This inequality is, however, in addition to that seen between different income groups, still prevalent in Turkey. Therefore, it is not difficult to explain why hypertension is high in the Muradiye district, which is a rural district with widespread low socioeconomic status. The negative effect of a low socioeconomic status has been shown in different populations in the literature (US ethnic studies). The contradiction between the high hypertension prevalence and low frequency of a family history is not a real contradiction. The rare family history of hypertension is information that we acquired from the women. Indeed, this is subjective information. It can be expected that this figure (only four women had a family history of hypertension) might be attributed to two main reasons. One is the probability of the lack of information that the parents of the women have or had hypertension or not. The second, and more important is the lack of a diagnosis of hypertension (unawareness of the disease) in the parents. Since the 1950s and 1960s, socialized health reform has not taken place in rural areas and almost no health services were made available to the rural population in Turkey, other than for some communicable diseases. The percentage of unawareness of hypertension among those over 65 was found to be about 40% even in one of the major cities of Turkey in 2000.⁴⁵⁾ The unawareness of hypertension was 34% in 1996 in Spanish women⁴⁴⁾ and 46% in a rural Japanese female⁴¹⁾ population in 2000. Based on these findings, one can say that the diagnosis of hypertension has

improved in the rural regions and a relatively important portion (76% mentioned above) has been taking medication for hypertension, though this still can not be regarded as adequate.

Therefore, the findings of this study do not permit us to conclude that the prevalence of hypertension has increased or decreased during the time course since information on the parents is probably lacking and invalid.

The total risk is only affected by age. As expected, high blood pressure was observed to be affected by socioeconomic level by multivariate analysis. The reason for this is considered to be the inequality in health services since the populations with a high socioeconomic status enjoy a high level of health services, a proper diet, and regular check-ups.

As previously reported, cardiovascular risk factors are thought to be high in people with low educational and low socioeconomic levels. A higher socioeconomic status was associated with lower levels of total and low-density lipoprotein cholesterol, lower serum levels of triglycerides, higher levels of high-density lipoprotein cholesterol, and lower blood pressure, and a low socioeconomic status has a stronger adverse influence on cardiovascular risk factors in women than it does in men. Coronary artery disease risk is equalised when risk factors are standardised in low and high socioeconomic populations.^{34,45)}

Conclusion: The cumulative cardiovascular risk among postmenopausal women is unexpectedly high in this rural district. This high risk probability is mainly attributable to a higher prevalence of uncontrolled hypertension, which is mostly prevalent in the lower socioeconomic classes. As stated in the World Health Report (1998), developing countries suffer from the double burden of both infectious diseases and chronic disorders. The results of this study once again have shown that horizontal population programs focusing on the prevention of cardiovascular risks in postmenopausal women should be carried out in routine primary health care services at the community level in rural communities.

REFERENCES

1. Turkish Society of Cardiology, Turkish Heart Report 2000, Yenilik Publication 11-25.
2. Feinleib, M. Cohort Studies, Detels R, McEwen J, Beaglehole R, Tanaka H (eds). Oxford Textbook of Public Health. Oxford University Press 1997; 562-5.
3. Vartiainen E, Jousilahti P, Alfthan G, Sundvall J, Pietinen P, Puska P. Cardiovascular risk factor changes in Finland 1972-1997. *Int. J. Epidemiology*, 2000; 29: 49-56.
4. Tunstall-Pedoe H, Kuulasmaa K, Mahonen M, Tolonen H, Ruokokoski E, Amouyel P. Contribution of trends in survival and coronary-event rates to changes in coronary heart disease mortality: 10-year results from 37 WHO MONICA project populations. Monitoring trends and determinants in cardiovascular disease. *Lancet* 1999; 353: 1547-57.
5. WHO Technical Report Series No: 678. Prevention of coronary heart disease. Report of a WHO Expert Committee, WHO, 1982, Geneva.
6. Rumeau-Rouquette C, Bouvier-Colle MH, Ringa V, Saurel-Cubizolles MJ. Women's Health. Oxford Textbook of Public Health. Third Edition. Detels R, Holland WW, McEwen J, Omenn GS, eds. Oxford University Press, Oxford 1997; 1355-78.
7. Ko GT, Chan JC, Woo J, *et al.* The effect of age on cardiovascular risk factors in Chinese women. *Int J Cardiol* 1997; 61: 221-7.
8. Brezinka V, Padmos I. Coronary heart disease risk factors in women. *Eur Heart J* 1994; 15: 1571-84.
9. Hennekens CH. Risk factors for coronary heart disease in women. *Cardiol Clin* 1998; 16: 1-8.
10. Brochier ML, Arwidson P. Coronary heart disease risk factors in women. *Eur Heart J* 1998; 19: A 45-52.
11. Corrao JM, Becker RC, Ockene IS, Hamilton GA. Coronary heart disease risk factors in women. *Cardiology* 1990; 77(Suppl 2): 8-24.
12. Molarius A, Seidell JC, Sans S, Tuomilhto J, Kuulasmaa K. Educational level, relative body weight, and changes in their association over 10 years: an international perspective from the WHO MONICA Project. *Am J Public Health* 2000; 90: 1260-8.
13. Osler M, Gerdes L, Gerdes LU, Davidsen M, *et al.* Socioeconomic status and trends in risk factors for cardiovascular diseases in the . Danish MONICA population, 1982-1992. *J Epidemiol Community Health* 2000; 54: 108-13.
14. Peltonen M, Huhtasaari F, Stegmayr B, Lundberg V, Asplund K. Secular trends in social patterning of cardiovascular risk factor levels in Sweden. The Northern Sweden MONICA Study 1986-1994. Multinational Monitoring of Trends and Determinants in Cardiovascular Disease. *J Intern Med* 1998; 1-9.
15. Hoeymans N, Smit HA, Verkleij H, Kromhout D. Cardiovascular risk factors in relation to educational level in 36,000 men and women in The Netherlands. *Eur Heart J* 1996; 17: 518-25.
16. Bennett S. Cardiovascular risk factors in Australia: trends in socioeconomic inequalities. *J Epidemiol Community Health* 1995; 49: 363-72.
17. Yu Z, Nissinen A, Vartiainen E, *et al.* Associations between socioeconomic status and cardiovascular risk factors in an urban population in China. *Bulletin of the World Health Organization* 2000; 78: 1296-305.
18. Onat, A. Turkish Adult Risk Factor Study (TEKHARF), in Turkish, Ohan publication, Istanbul 2000.
19. Onat A, Sansoy V, Yildirim B *et al.* Investigation of blood pressure levels in Turkish adults: 8-year trends, rate of treatment, relationship to other risk factors and to coronary disease. *Turk. Soc. of Cardiol Arch* 1999; 27: 136-43.
20. Hubert HB, Feinleib M, McNamara PM, Castelli WP. Obesity as an independent risk factor for cardiovascular disease: A 26 year follow up of participants in the Framingham Study. *Circulation* 1983; 67: 968.
21. Singh RB, Ghosh S, Niaz AM *et al.* Epidemiologic study of diet and coronary risk factors in relation to central obesity and insulin levels in rural and urban populations of north India. *Int J Cardiol* 1995: 245-55.
22. Seidell JC, Cigolini M, Charzewska J, Ellsinger BM, di Biase G. Fat distribution in European women: a comparison of anthropometric measurements in relation to cardiovascular risk factors. *Int J Epidemiol* 1990; 19: 303-8.
23. Lean ME, Han TS, Seidell JC. Impairment of health and quality of life in people with large waist circumference. *Lancet* 1998; 351: 853-6.

24. Saxena S, Carlson D, Billington R. The WHO quality of life assessment instrument (WHOQOL-Bref): the importance of its items for cross-cultural research. *Qual Life Res* 2001; 10: 711-21.
25. Prevention of coronary heart disease in clinical practice. Recommendations of the Second Joint Task Force of European and other Societies on coronary prevention. *Eur Heart J* 1998; 19: 1434-503.
26. National Cholesterol Education Program. Report of the Expert Panel on Population Strategies for Blood Cholesterol Reduction. Bethesda, MD: National Institutes of Health; National Heart, Lung, and Blood Institute; National Cholesterol Education Program; 1990. DHHS publication NIH 90-3046.
27. Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. The sixth report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Arch Intern Med* 1997; 157: 2413-46.
28. Benowitz NL. Cigarette smoking and nicotine addiction. *Med Clin North Am* 1992; 76: 415-37.
29. Simoes JA, Gama ME, Contente CB. Prevalence of cardiovascular risk factors in a rural population between 25 and 44 years old. *Rev Port Cardiol* 2000; 19: 693-703.
30. Lowe LP, Greenland P, Ruth KJ, Dyer AR, Stamler R, Stamler J. Impact of major cardiovascular disease risk factors, particularly in combination, on 22-year mortality in women and men. *Arch Intern Med* 1998; 158: 2007-14.
31. Castelli WP, Garrison RJ, Wilson PWF, Abbott RD, Kalousdian S, Kannel WB. Incidence of coronary heart disease and lipoprotein cholesterol levels: the Framingham Study. *JAMA* 1986; 256: 2835-8.
32. Isles CG, Hole DJ, Gillis CR, Hawthorne VM, Lever AF. Plasma cholesterol, coronary heart disease, and cancer in the Renfrew and Paisley survey. *BMJ* 1989; 289: 920-4.
33. MacLean DR, Petrasovits A, Nargundkar M, *et al.* Canadian heart health surveys: a profile of cardiovascular risk. *CMAJ* 1992; 146: 1969-74.
34. Manhem K, Dotevall A, Wilhelmsen L, Rosengren A. Social gradients in cardiovascular risk factors and symptoms of Swedish men and women: the Goteborg MONICA Study 1995. *J Cardiovasc Risk* 2000; 7: 359-68.
35. Wenger NK. Hypertension and the other cardiovascular risk factors in women. *Am J Hypertension* 1995; 8: 94-9.
36. Mennen LJ, Witteman JC, Geleijnse JM, *et al.* Risk factors for cardiovascular diseases in the elderly; the ERGO Study (Erasmus Rotterdam Health and the Elderly). *Ned Tijdschr Geneesk* 1995; 30: 1983-8.
37. Castanho VS, Oliveira LS, Pinheiro HP, *et al.* Sex differences in risk factors for coronary heart disease: a study in a Brazilian population. *BMC Public Health* 2001; 1: 3.
38. Bullen C, Simmons G, Trye P, *et al.* Cardiovascular disease risk factors in 65-84 year old men and women: results from the Auckland University Heart and Health Study 1993-4. *NZ Med J* 1998; 111: 4-7.
39. Ucku R, Erbay P, Aksakoglu G. Narlidere bölgesinde eriskinlerde diabetes mellitus prevalansi ve risk faktörleri. IV. [in Turkish] National Public Health Congress, Didim, 1994; 617-8.
40. Yorulmaz F, Kayki E, Erdim NG, Vural R, Kale T, Deveci S. Kesan 3 nolu merkez saglik ocagi bölgesine bagli 6 köyde diabetes mellitus taramasi. (Diabetes mellitus screening results on 6 rural settlements in Kesan no 3 Health Center District) 7th Public Health days, P26 Eskisehir 2001.
41. Asai Y, Isikawa S, Kuyaba K, *et al.* Prevalance, awareness, treatment and control of hypertension in Japanese rural communities [in Japanese]. *Nippon Koshu Eisei Zasshi* 2001; 48: 827-36.
42. Kocoglu G, Sumer H, Polat H, Ozdemir L, Nur N, Aker A, Bakirci Z. Sivas il merkezindeki yaslilarda bazı kronik hastaliklarin görölme sikligi (The frequency of some chronic disease in Sivas city center) 7th Public Health days, P26 Eskisehir 2001.
43. Diker J, Seref B, Karatas N. 65 yas üzeri kisilerde hipertansiyon sikligi ve hipertansiyonun günlük yasam aktiviteleri, yasam kalitesi ile iliskisi. (Hypertension frequency in 65 and over aged persons and the relationship between hypertension and daily activities and quality of life) 7th Public Health days, P26 Eskisehir 2001.
44. Sans S, Paluzie G, Balana L, *et al.* Trends in prevalence, awareness, treatment and control of arterial hypertension between 1986 and 1996: the MONICA-Catalonia Study. *Med Clinic (Barc)* 2001; 117: 246-53.
45. Greenland KJ, Giles WH, Keenan NL, *et al.* Prevalence of multiple cardiovascular risk factors among women in the US, 1992 and 1995: The behavioral risk factor surveillance system. *J Women's Health* 1998; 7: 1125-33.