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CHARACTERISTICS OF CARDIOVASCULAR RISK FACTORS AND THEIR CORRELATION WITH THE SEX AND AGE OF PATIENTS IN THE LATVIAN POPULATION

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Various cardiovascular risk factors (RFs) were determined in 773 out-patients (mean age 55.8 ± 14.5 years). Male individuals had a larger waist circumference (WC) than did female patients (99.1 ± 13.6 cm vs 93.3 ± 15.2 cm), higher diastolic blood pressure (DBP) (83.6 ± 9.6 mmHg vs 81.8 ± 9.6 mmHg), and higher levels of blood glucose (5.73 ± 1.4 mmol/L vs 5.49 ± 1.3 mmol/L) and triglycerides (TG) (1.89 ± 1.3 mmol/L vs 1.60 ± 1.0 mmol/L), but lower levels of total cholesterol (TC) (5.54 ± 1.2 mmol/L vs 5.79 ± 1.2 mmol/L) and high-density lipoprotein cholesterol (HDL-C) (1.21 ± 0.4 mmol/L vs 1.44 ± 0.4 mmol/L). Compared with the younger age group (i.e., males, < 7 years; females, < 65 years), patients in the older age group had a larger WC (98.4 ± 14.2 cm vs 92.8 ± 15.1 cm), higher systolic blood pressure (SBP) (144.2 ± 19.2 mmHg vs 131.6 ± 18.5 mmHg), higher DBP (84.5 ± 8.8 mmHg vs 80.9 ± 9.8 mmHg), higher blood glucose level (5.74 ± 1.3 mmol/L vs 5.46 ± 1.3 mmol/L), and higher low-density lipoprotein cholesterol level (LDL-C) (3.68 ± 1.0 mmol/L vs 3.52 ± 1.0 mmol/L), but lower HDL-C level (1.3 ± 0.4 mmol/L vs 1.41 ± 0.4 mmol/L). Age was significantly correlated with all RFs, with the exception of the level of C-reactive protein. In conclusion, analysis of cardiovascular RFs in different age subgroups of both sexes clearly showed individual peculiarities of risk profile. This conclusion challenges the usual way of risk calculation using "universal" markers like adiposity or dyslipidemia in all population. The new approach requires individual attention depending on sex and age also in management of risk.

Key words: *risk factors, serum lipids.*

INTRODUCTION

The development of cardiovascular disease depends mainly on the presence of risk factors (RFs). Over 200 cardiovascular RFs have been described (Gotto and Pownal, 2003), with the most important being age, sex, smoking habit, diabetes mellitus, elevated blood pressure (BP), high level of low-density lipoprotein cholesterol (LDL-C), low level of high-density lipoprotein cholesterol (HDL-C), and unfavourable family history (Gotto and Pownal, 2003; Smith *et al.,* 2004; Smith and Milani, 2004). Obesity and sedentary lifestyle are additional and supporting RFs (Gotto and Pownal, 2003; Smith *et al.,* 2004), whereas recently demonstrated RFs include elevated triglyceride (TG) levels and various inflammatory markers; e.g., C-reactive protein (CRP) (Smith *et al.,* 2004).

The total cardiovascular disease risk is estimated not only by the number and degree of RFs (Smith *et al.,* 2004), but also by their interaction (Gotto and Pownal, 2003; Venereanu, 2006), as RFs are often combined and act synergistically (Gotto and Pownal, 2003). Metabolic RFs have recently been identified from cardiovascular RFs and pooled in a metabolic syndrome that includes abdominal obesity, abnormal glucose tolerance, elevated blood pressure, increased TG levels, and decreased HDL-C levels (Gotto and Pownal, 2003).

Many RFs share the same pathogenetic mechanism and are commonly present at the same time; e.g., obesity associated with arterial hypertension and dyslipidaemia, dyslipidaemia and arterial hypertension, and summarising of RFs in a metabolic syndrome setting (Erhardt and Betterige, 2004; Weycker *et al.,* 2007). More than 50% of patients with arterial hypertension have dyslipidaemia and increased body mass index (BMI) (Weycker *et al.,*2007). Patients with obesity have higher systolic and diastolic blood pressure (SBP and DBP) and higher levels of blood glucose, total cholesterol, and TGs (De Lusignan *et al.,* 2006); thus, the "harmfulness" of RFs is determined by their unfavourable influence on the endothelium, which induces endothelial

dysfunction as the main pathogenetic mechanism of atherosclerosis.

Studies of mutual correlations between RFs have shown that increased BMI and waist circumference (WC) correlate with glycaemia, TG levels, and BP; however, an inverse correlation has been reported between these two RFs and HDL-C levels (Rezende *et al.,* 2006). Japanese studies have revealed a more pronounced mutual correlation in females, particularly between TG and CRP levels (Oda *et al.,* 2006). The total cardiovascular risk increase in females is the result of increased RF correlation rates. RF correlation is determined by the following data: a decrease in obesity results in lower SBP and DBP and elevated HDL-C levels (Inzucchi *et al.,* 2007), and the regression of atherosclerosis is more pronounced as a result of a concomitant reduction in LDL-C levels and increase in HDL-C levels (Aiviram, 2007). Therefore, attempts to minimise cardiovascular RFs should always be multifactorial, and as many RFs as possible should be influenced concomitantly (Gotto and Pownal, 2003).

The successful prevention of cardiovascular disease is based on the identification of RFs and their effective correction. One of the great achievements over recent decades in the quest to reduce the mortality associated with cardiovascular disease in the USA has been the active and successful fight against unfavourable RFs (Ford *et al.,* 2007). Almost half (44%) of the reduction in the cardiovascular disease-related mortality is associated with changes in RFs, whereas the remaining half is associated with the successful treatment of cardiovascular problems (e.g., re-vascularisation and treatment of heart failure and acute coronary syndrome).

Over the past 40 years in the USA, total cholesterol (TC) levels and BP have decreased in patients with obesity. These patients also smoke less; however, the prevalence of diabetes mellitus has increased (Gregg *et al.,* 2005). A large international study (Yusuf *et al.,* 2004) showed that traditional RFs (e.g., dyslipidaemia, smoking, arterial hypertension (AH), and abdominal obesity) promote the development of myocardial infarction; thus, prevention of cardiovascular disease should be based on a simple principle: the elimination of RFs. It should be noted that this previous study also showed that the prevalence of RFs and their correlation with myocardial infarction are different in various countries and ethnic groups. The marked variation in the prevalence of atherosclerosis and cardiovascular disease in different countries may be explained by the variability in the prevalence of specific RFs in these countries._

It would be ideal to elaborate individual risk reduction models for each patient or patient group (Vinereanu, 2006). The differential access to various patient groups, based on the levels of RFs and their correlation, is important in reducing the risk of cardiovascular disease.

Of particular importance is the examination of the total cardiovascular risk as it pertains to sex and age. It is well known that the development of cardiovascular disease in pre-menopausal women occurs ten years later than in men; however, after menopause, the incidence of the disease is similar between men and women. The significance of the data regarding the variation of different cardiovascular RFs according to sex remains controversial. For example, higher CRP levels have been reported in females (Arena *et al.,* 2006), and previous studies have debated the prevalence of obesity in females compared with males (De Lusignan *et al.*, 2006; Rezende *et al.,* 2006). It has also been suggested that AH and diabetes have a greater impact in females (Yusuf *et al.,* 2004). In the presence of several RFs, the risk of coronary heart disease (CHD) is seven-fold greater in males and five-fold greater in females than the risk in persons with no cardiovascular RFs (Gotto *et al.,* 2003).

The effect of obesity differs between males and females. Increased BMI is a RF for stroke in both sexes; however, increased WC is only a RF in males (Hu *et al.,* 2007). The degree of obesity also has a different impact in males and females. In younger patients (< 55 years), a BMI > 21 kg/m^2 in females and > 25 kg/m^2 in males is considered a cardiovascular RF; in older patients (> 55 years), the risk BMI threshold is > 30 kg/m^2. Available data suggest that dyslipidaemia is an independent RF only in males; in females, the risk may be determined by more extensive oxidative stress rather than the levels of lipids (Vassalle *et al.,* 2007).

An examination of the correlation of other RFs with age revealed that only the correlation with TG levels should be considered. No significant correlation was found between age and obesity, HDL-C, SBP, or DBP (Agheishahsavari *et al.,* 2006). Significantly higher LDL-C, CRP, and oxidized LDL-C levels were found in females older than 56. In contrast, TG and HDL-C levels do not vary with age. A direct correlation between age and CRP and oxidized LDL-C levels has been reported in females.

The prevalence of RFs in various regions and countries throughout the world shows considerable variation, thereby explaining the different mortality rates from cardiovascular diseases worldwide. The situation is very unfavourable in Latvia, as the cardiovascular mortality rate is one of the highest in Europe. The prevalence of RFs and their mutual correlations, especially regarding sex and age, are poorly studied in Latvia.

Taking into consideration the great variation in cardiovascular RFs and mortality rate among different countries and regions, as well as the controversial data regarding the correlation and interaction between RFs, particularly for sex and age, the aim of our study was to characterise the main cardiovascular RFs and their correlation with sex and age in the Latvian population.

MATERIALS AND METHODS

To collect data on the prevalence of cardiovascular RFs, we examined patients who attended their primary care setting

(PCS) for a planned visit to deal with any health-related problem. A total of 773 persons examined by their doctor in 30 PCSs over a period of four days were asked to provide data about their health status (objective investigations). Blood samples were collected from all patients. PCSs were distributed throughout all regions of Latvia, including Rīga. All persons were included by voluntary consent. The exclusion criteria were as follows: age < 18 years and > 75 years, renal disease with chronic renal failure, thyroid gland disease with hyper- or hypo-function, liver disease with liver-cell insufficiency, oncological disease with dissemination and possible influence on metabolism, and signs of acute inflammatory process. All patients gave their informed consent to the protocol, which was approved by the local Medical Ethics Committee of Latvian Institute of Cardiology of University of Latvia for Medical Research.

Physical examination (height, weight, and BP and WC measurement) was carried out using standardised and certified measuring devices. The statistical software SPSS was used for the storage and processing of obtained data.

The following parameters and cardiovascular RFs were evaluated separately in males and females, as well in different age groups (males, < 55 and ≥ 55 years; females, < 65 and ≥ 65 years): body mass, height, WC, BMI, SBP, DBP, heart rate (HR), blood glucose level, and levels of TC, LDL-C, HDL-C, TG, and CRP. We also compared the RFs in a younger age group (males, < 55 years; females, < 65 years) with those in an older age group (males, ≥ 55 years; females, ≥ 65 years). Fasting concentrations of lipids and glucose were analysed using standard methods. After testing the normality of date distribution, statistical differences between the above mentioned groups were assessed using t-test. Data were recorded as the mean ± SD, and two-tailed values of $P < 0.05$ were considered significant. Pearson's correlation coefficient (PCC) was used to assess the correlation of RFs with sex and age.

RESULTS

Among all patients questioned, 71.3% were female, 21.6% were smokers, 52.7% had pre-existing AH, and 10.9% had previously diagnosed diabetes. The patient group was characterised by the following parameters (± standard deviations (SD)): mean age, 55.6 ± 14.5 years; BMI, 28.98 ± 5.61 kg/m^2; WC, 94.9 ± 14.9 cm; SBP, 136.3 ± 19.8 mmHg; DBP, 82.3 ± 9.6 mmHg; HR, 73.8 ± 8.1 beats per minute; blood glucose level, 5.56 ± 1.33 mmol/L; TC, 5.72 ± 1.22 mmol/L; LDL, C 3.58 ± 1.03 mmol/L; HDL-C, 1.38 ± 0.38 mmol/L; TG, 1.69 ± 1.15 mmol/L; CRP, 3.87 ± 8.50 mg/L.

Tables 1 and 2 list the main differences and level of significance (P) of patient characteristics and cardiovascular RFs in subgroups organised according to sex and age.

The results listed in Table 1 reveal higher values of WC, DBP, and levels of blood glucose and TG in males, and lower values of TC and HDL-C. Compared with the younger age group, the older group had higher values of WC, SBP, DBP, blood glucose level, and LDL-C, and lower values of HDL-C. We observed no significant difference in the levels of TC and TG between older and younger individuals, and no differences in the levels of CRP and HR between sexes and age groups.

Separate analysis of the two age subgroups according to sex (Table 2) revealed that older males (≥ 55 years) had shorter height, but larger WC and SBP when compared with younger males. We observed no differences for the other parameters. Analysis of the two age subgroups in females re-

Table 1

VARIABILITY IN CARDIOVASCULAR RISK FACTORS ACCORDING TO SEX AND AGE (MEAN ± SD)

Parameter	Male	Female	*P*	Younger age group	Older age group	*P*
Body mass	88.2 ± 15.8	78.7 ± 15.8	*0.000*	80.9 ± 17.3	82.2 ± 14.5	*0.297*
Height	176.3 ± 7.3	164.2 ± 6.0	*0.000*	167.9 ± 8.5	167.3 ± 8.4	*0.364*
WC	99.13 ± 13.6	93.3 ± 15.2	*0.000*	92.8 ± 15.1	98.4 ± 14.2	*0.000*
BMI	28.37 ± 4.69	29.22 ± 5.92	*0.055*	28.73 ± 5.96	29.37 ± 4.95	*0.126*
SBP	138.0 ± 18.6	135.7 ± 20.2	*0.134*	131.6 ± 18.5	144.2 ± 19.3	*0.000*
DBP	83.6 ± 9.6	81.8 ± 9.6	*0.018*	80.9 ± 9.8	84.5 ± 8.8	*0.000*
HR	78.4 ± 9.3	73.6 ± 7.5	*0.216*	73.4 ± 7.9	74.5 ± 8.4	*0.057*
Glucose	5.73 ± 1.45	5.49 ± 1.27	*0.021*	5.46 ± 1.31	5.74 ± 1.34	*0.004*
TC	5.54 ± 1.19	5.79 ± 1.22	*0.009*	5.67 ± 1.24	5.80 ± 1.17	*0.153*
LDL-C	3.49 ± 0.95	3.61 ± 1.05	*0.146*	3.52 ± 1.04	3.68 ± 0.98	*0.046*
HDL-C	1.21 ± 0.36	1.44 ± 0.36	*0.000*	1.41 ± 0.38	1.33 ± 0.37	*0.006*
TG	1.89 ± 1.33	1.60 ± 1.05	*0.001*	1.64 ± 1.19	1.76 ± 1.07	*0.170*
CRP	4.65 ± 10.72	3.56 ± 7.41	*0.106*	3.73 ± 9.85	4.12 ± 5.61	*0.536*

Younger age group = males, < 55 years; females, < 65 years. Older age group = males ≥ 55 years; females, ≥ 65 years. Body mass (kg); height (cm); WC, waist circumference (cm); BMI, body mass index (kg/m^2); SBP and DBP, systolic and diastolic blood pressure (mm Hg); HR, heart rate (beats per min); glucose (mmolog /L); TC, total cholesterol (mmol/L); LDL-C, low-density lipoprotein cholesterol (mmol/L); HDL-C, high-density lipoprotein cholesterol (mmol/L); TG, triglycerides (mmol/L); CRP, C-reactive protein (mg/L)

Table 2

CHANGES IN ANTHROPOMETRIC AND PHYSICAL PARAMETERS, AND CARDIOVASCULAR RISK FACTORS IN SUBGROUPS ORGANISED ACCORDING TO SEX AND AGE (MEAN ± SD)

Parameter	Male		*P*	Female		*P*	*P**	*P***
	< 55	≥ 55		< 65	≥ 65			
Age	41.0 ± 10.0	66.1 ± 7.1	*0.000*	48.9 ± 11.2	71.5 ± 4.3	*0.000*	*0.000*	*0.000*
Body mass	90.1 ± 15.9	86.7 ± 15.6	*0.114*	78.6 ± 16.9	78.9 ± 13.4	*0.802*	*0.000*	*0.000*
Height	179.1 ± 6.9	174.0 ± 6.7	*0.000*	165.0 ± 6.1	162.5 ± 5.6	*0.000*	*0.000*	*0.000*
WC	96.7 ± 12.9	101.0 ± 13.9	*0.020*	91.8 ± 15.4	96.5 ± 14.2	*0.001*	*0.004*	*0.006*
BMI	28.08 ± 4.65	28.61 ± 4.73	*0.403*	28.91 ± 6.25	29.93 ± 5.06	*0.061*	*0.215*	*0.024*
SBP	133.0 ± 17.4	142.0 ± 18.7	*0.000*	131.2 ± 18.8	145.7 ± 19.6	*0.000*	*0.388*	*0.109*
DBP	82.8 ± 9.9	84.2 ± 9.4	*0.296*	80.4 ± 9.8	84.8 ± 8.4	*0.000*	*0.030*	*0.558*
HR	74.3 ± 9.0	74.4 ± 9.6	*0.914*	73.1 ± 7.5	74.6 ± 7.5	*0.039*	*0.191*	*0.888*
Glucose	5.58 ± 1.36	5.86 ± 1.51	*0.156*	5.42 ± 1.30	5.65 ± 1.21	*0.052*	*0.279*	*0.191*
TC	5.45 ± 1.22	5.61 ± 1.17	*0.328*	5.73 ± 1.25	5.94 ± 1.15	*0.062*	*0.049*	*0.018*
LDL-C	3.37 ± 0.91	3.58 ± 0.98	*0.103*	3.56 ± 1.07	3.74 ± 0.99	*0.063*	*0.121*	*0.193*
HDL-C	1.22 ± 0.36	1.21 ± 0.37	*0.775*	1.45 ± 0.37	1.41 ± 0.35	*0.286*	*0.000*	*0.000*
TG	2.01 ± 1.66	1.80 ± 0.97	*0.247*	1.55 ± 1.01	1.72 ± 1.13	*0.063*	*0.001*	*0.564*
CRP	4.41 ± 14.72	4.85 ± 5.84	*0.764*	3.55 ± 8.15	3.59 ± 5.40	*0.956*	*0.439*	*0.058*

*P** males < 55 years vs females < 65 years; *P*** males ≥ 55 years vs females ≥ 65 years; body mass (kg); height (cm); WC, waist circumference (cm); BMI, body mass index (kg/m^2); SBP and DBP, systolic and diastolic blood pressure (mm Hg); HR, heart rate (beats per min); glucose (mmol/L); TC, total cholesterol (mmol/L); LDL-C, low-density lipoprotein cholesterol (mmol/L); HDL-C, high-density lipoprotein cholesterol (mmol/L); TG, triglycerides (mmol/L); CRP, C-reactive protein (mg/L)

vealed the presence of shorter height in the older subgroup. We also found a larger WC and higher SBP, DBP, and HR in females than in males. Compared with the older female subgroup, the younger male subgroup showed larger WC, higher DBP, and lower TC and HDL-C levels. When correlating age with other parameters in the general study group and by sex and age, we took into consideration the marked differences in RFs between males and females and among the various age subgroups (Table 3).

Age correlated with all the investigated parameters except for CRP. We found an inverse correlation between height and HDL-C levels. The correlations observed for females were similar to those found in the general study group. A comparison of all subgroups revealed that the highest PCC occurred between age and other RFs in females younger than 65 years. In older males and females, age did not correlate with any of the RFs under investigation. These results indicate that the impact of the RFs was heightened with increasing age in females younger than 65 years, and partly in males younger than 55 years. It should be noted that above these thresholds, age did not influence RFs. The strongest correlations (i.e., the highest PCC values) between age and WC, SBP, TC, and LDL-C levels were found in the younger female subgroup. An inverse correlation was found between these parameters and increasing age. Blood glucose level correlated with age only in the younger age subgroups. We found an increase in WC, BMI, SBP, DBP, blood glucose level, TC, LDL-C, and TG with increasing age, whereas HDL-C levels decreased with increasing age. We observed no increase in these parameters in males older than 55 years and in females older than 65 years; we even found a negative PCC value. These results suggest that WC, DBP, blood glucose, LDL-C, and TG values do not increase with increasing age; in fact, these parameters tended to decrease with age.

DISCUSSION

Our observations reveal great differences in the characteristics of the cardiovascular RFs investigated in patients of both sexes. Higher values of WC, DBP, blood glucose level, and TG were found in males than in females, whereas TC and HDL-C levels were lower in males. We also found different values for DBP, blood glucose, TC, and TG according to sex. We suggest that the generally accepted difference between male and female WC values (14 cm) is too large: our Latvian data suggest it could be as little as 5–6 cm. It is interesting that of the two obesity parameters (WC and BMI), only WC increased with increasing age. A decrease in the degree of obesity starting at 64 years of age has been described in the literature (De Lusignan *et al.,* 2006). There is no justification to set different normal values for DBP, blood glucose, TC, and TG in males and females; however, the differences detected in our study warrant further investigation. Our data show that in the general study group, DBP is lower in females than in males; however, DBP did not increase with increasing age in males, as it did in females.

Our evaluation of changes in lipid profiles revealed that females had higher TC, HDL-C, and TG levels than did males; however, we did not find any marked differences between sexes regarding LDL-C levels. More pronounced lipid changes (with the exception of HDL-C) have been re-

Table 3

CORRELATION INDEX (PCI) FOR AGE AND OTHER PARAMETERS IN THE GENERAL STUDY GROUP, IN MALES AND FEMALES, AND IN THE VARIOUS AGE SUBGROUPS

Parameter		GG	Younger group	Older group	M	F	Male		Female	
							< 55	≥ 55	< 65	≥ 65
Body mass	PCC	0.073	0.145	-0.203	-0.115	0.168	0.041	-0.152	0.280	-0.043
	P	*0.044*	*0.001*	*0.000*	*0.088*	*0.000*	*0.688*	*0.094*	*0.000*	*0.582*
Height	PCC	-0.268	-0372	-0.370	-0.394	-0.293	-0.252	-0.137	-0.262	-0.088
	P	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.012*	*0.131*	*0.000*	*0.255*
WC	PCC	0.286	0.334	-0.071	0.185	0.340	0.199	0.002	0.427	-0.009
	P	*0.000*	*0.000*	*0.226*	*0.006*	*0.000*	*0.048*	*0.983*	*0.000*	*0.911*
BMI	PCC	0.219	0.340	0.006	0.064	0.372	0.157	-0.108	0.369	-0.005
	P	*0.000*	*0.000*	*0.916*	*0.341*	*0.000*	*0.120*	*0.234*	*0.000*	*0.950*
SBP	PCC	0.415	0.372	0.104	0.303	0.463	0.292	0.093	0.422	0.050
	P	*0.000*	*0.000*	*0.077*	*0.000*	*0.000*	*0.003*	*0.305*	*0.000*	*0.520*
DBP	PCC*P*	0.284	0.309	-0.037	0.102	0.368	0.208	-0.075	0.387	-0.037
		0.000	*0.000*	*0.527*	*0.131*	*0.000*	*0.039*	*0.408*	*0.000*	*0.637*
HR	PCC	0.09	0.068	0.042	0.045	0.116	0.126	0.012	0.079	0.090
	P	*0.012*	*0.137*	*0.471*	*0.501*	*0.006*	*0.212*	*0.891*	*0.125*	*0.243*
Glucose	PCC	0.178	0.217	-0.020	0.170	0.187	0.332	-0.002	0.220	0.039
	P	*0.000*	*0.000*	*0.734*	*0.011*	*0.000*	*0.001*	*0.986*	*0.000*	*0.613*
TC	PCC	0.230	0.393	0.033	0.100	0.283	0.214	-0.074	0.423	-0.147
	P	*0.000*	*0.000*	*0.576*	*0.138*	*0.000*	*0.033*	*0.419*	*0.000*	*0.056*
LDL-C	PCC	0.236	0.381	-0.053	0.113	0.282	0.126	-0.058	0.423	-0.150
	P	*0.000*	*0.000*	*0.376*	*0.106*	*0.000*	*0.243*	*0.533*	*0.000*	*0.054*
HDL-C	PCC	-0.077	-0.029	0.060	-0.067	-0.098	-0.043	-0.145	-0.119	0.023
	P	*0.033*	*0.530*	*0.307*	*0.323*	*0.022*	*0.674*	*0.109*	*0.020*	*0.770*
TG	PCC	0.115	0.165	-0.034	-0.002	0.186	0.156	0.024	0.256	-0.071
	P	*0.001*	*0.000*	*0.560*	*0.971*	*0.000*	*0.122*	*0.796*	*0.000*	*0.361*
CRP	PCC	0.031	0.034	-0.051	0.077	0.006	0.155	-0.019	-0.005	0.016
	P	*0.397*	*0.452*	*0.387*	*0.256*	*0.896*	*0.126*	*0.836*	*0.928*	*0.832*

GG, general study group; younger age group = males, < 55 years and females, < 65 years; older age group = males, ≥ 55 years and females, ≥ 65 years; body mass (kg); height (cm); WC, waist circumference (cm); BMI, body mass index (kg/m^2); SBP and DBP, systolic and diastolic blood pressure (mm Hg); HR, heart rate (beats per min.); glucose (mmol/L); TC, total cholesterol (mmol/L); LDL-C, low-density lipoprotein cholesterol (mmol/L); HDL-C, high-density lipoprotein cholesterol (mmol/L); TG, triglycerides (mmol/L); CRP, C-reactive protein (mg/L)

ported previously in females (Aghaeishahvari *et al.,* 2006). Levels of LDL-C and HDL-C were higher and lower, respectively, in the older age subgroups; however, levels of TG were similar in all age groups. The literature reports (Aghaeishahvari *et al.,* 2006) that TG is the only lipid to correlate with age, yet we found correlations between age and TC, LDL-C, and TG levels, and an inverse correlation between age and HDL-C levels in the general study group. We found no such correlations in the male subgroup. Increased values of SBP, DBP, blood glucose, and LDL-C were found in older age subgroups, as well as decreased levels of HDL-C. In contrast, the levels of TC and TG remained unchanged with age. A stronger correlation among RFs was found previously in females (Oda *et al.,* 2006).

The evaluation of RFs enables the identification of patient subgroups with the most unfavourable RF development with increasing age. Prevention of the development of these RFs could be a highly effective strategy in the prevention of cardiovascular disease.

We found an increase in WC, SBP, and blood glucose levels with increasing age, independently of sex; however, increased BMI, TC, LDL-C, and TG were observed with increasing age exclusively in females, along with decreasing HDL-C. In the younger age subgroups, we found increasing WC, BMI, SBP, DBP, blood glucose, TC, LDL-C, and TG with increasing age in both sexes, and decreasing HDL-C; in contrast, these parameters did not change with age in the older age subgroups.

Our data suggest that the effective prevention of cardiovascular risk increase is more reasonable in younger age groups and in females. Although young females have a lower cardiovascular risk in general, primary and secondary prevention measures would be most effective in this population. The most promising and possibly most effective RF corrections would pertain to WC, BMI, SB, and DBP in younger age groups of both sexes, as well as correction of lipid levels in younger females. Relatively high risks of dyslipidaemia and AH have been reported in the literature in younger patients. The correlation of age with blood glucose level, WC, SBP, and DBP exclusively in younger patient groups may indicate the necessity of a more active correction of metabolic syndrome in younger patients. It should also be noted that a higher diabetes risk has been reported in younger individuals, especially in females (Yusuf *et al.,* 2004).

In conclusion, analysis of cardiovascular risk factors in different age subgroups of both sexes clearly showed individual peculiarities of risk profile. This conclusion challenges the usual way of risk calculation using "universal" markers like adiposity or dyslipidemia in all population. The new approach requires individual attention depending on sex and age also in management of risk.

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KARDIOVASKULĀRIE RISKA FAKTORI UN TO KORELĀCIJA AR PACIENTU DZIMUMU UN VECUMU LATVIJĀ

773 ambulatoriem pacientiem (ar vidējo vecumu 55,8 ± 14,5 gadi) tika analizēti dažādi sirds asinsvadu slimību (SAS) riska faktori (RF). No izmeklētajiem pacientiem, vīriešiem bija lielāks vēdera apkārtmērs (VA) kā sievietēm (99,1 ± 13,6 cm pret 93,3 ± 15,2 cm), augstāks diastoliskais asinsspiediens (DAS) (83,6 ± 9,6 mmHG pret 81,8 ± 9,6 mmHG), augstāks glikozes (5,73 ± 1,4 mmol/L pret 5,49 ± 1,3 mmol/L) un triglicerīdu (TG) (1,89 ± 1,3 mmol/L pret 1,60 ± 1,0 mmol/L) līmenis, bet zemāks kopējā holesterīna (KH) (5,54 ± 1,2 mmol/L pret 5,79 ± 1,2 mmol/L) un augsta blīvuma lipoproteīnu (ABLH) (1,21 ± 0,4 pret 1,44 ± 0,4 mmol/L) līmenis. Salīdzinot jaunāko pacientu grupu (t.i. vīrieši < 55 gadiem un sievietes <65 gadiem) ar vecāko pacientu grupu, vecākajiem bija lielāks VA (98,4 ± 14,2 cm pret 92,8 ± 15,1 cm), augstāks sistoliskais asinsspiediens (SAS) (144,2 ± 19,2 mmHg pret 131,6 ± 18,5 mmHg), augstāks DAS (84,5 ± 8,8 mmHg pret 80,9 ± 9,8 mmHg), augstāks glikozes līmenis (5,74 ± 1,3 mmol/L pret 5,46 ± 1,3 mmol/L) un augstāks zema blīvuma lipoproteīnu holesterīna (3,68 ± 1,0 mmol/L pret 3,52 ± 1,0 mmol/L) līmenis, bet zemāks ABLH līmenis (1,3 ± 0,4 mmol/L pret 1,41 ± 0,4 mmol/L). Vecums ticami korelēja ar visiem riska faktoriem izņemot C-reaktīvo olbaltumu. Pētījums parādīja to, ka katrai vecuma un abu dzimuma grupām ir atšķirīgi dominējošie riska faktori, un to ietekmes novēršanai mazināšanai nepieciešamas atšķirīgas pieejas.