Coll. Antropol. **32** (2008) 2: 391–397
Original scientific paper

Influence of Psychosocial Work-Related Factors on Conventional Risk Factors of Ischemic Heart Disease and Homocysteine in Slovenian Male Workers

Tihomir Ratkajec[1], Marjan Bilban[2] and Radovan Starc[3]

[1] Occupational Health Service Rogaška, Rogaška Slatina, Slovenia
[2] Institute of Occupational Safety, Ljubljana, Slovenia
[3] Clinical Center of Ljubljana, Ljubljana, Slovenia

A B S T R A C T

The influence of psychosocial work-related factors on the conventional risk factors of ischemic heart disease (IHD), particularly on the lipid changes and their effect on homocysteine is studied in this paper. Employed males aged 35 to 55 with angina pectoris or a myocardial infarction (IHD group) were compared to a group of individuals without ischemic heart disease (Control Group). Psychosocial factors were assessed using a Swedish Theorell questionnaire. The IHD Group was found to be at a higher risk of IHD due to higher work demands (OR = 1.25), worse job control (OR = 1.23), frequent smoking (OR = 2.2), leadership positions (OR = 3.97), higher BMI (p = 0.059) and higher levels of triglycerides (p = 0.005) and LDL-cholesterol (OR = 1.65). The level of HDL-cholesterol was significantly lower (1.0 vs. 1.4 mmol/L, p < 0.001, OR =1,64), while the level of C-reactive protein (9.1 vs. 1.8 mg/L) and Interleukin-6 (6.5 vs. 1.6 ng/L) was higher. Homocysteine levels showed borderline significance (p = 0.056). Our study suggests a possible influence of psychosocial work-related factors on IHD risk factors, most of all on low HDL-cholesterol. No connection was found between psychosocial factors and the homocysteine level, shown to be an IHD risk factor at lower levels of approximately 10 μmol/L.

Key words: *risk factors, ischemic heart disease, HDL-cholesterol, homocysteine, Slovenia*

Introduction

Recent studies provide clear and convincing evidence that psychosocial factors contribute significantly to the pathogenesis and expression of coronary heart disease (CHD)[1–3]. Five areas of the psychosocial factors – chronic life stress, socioeconomic status (SES), personality, depression, and social support have been most thoroughly studied[1]. People with a low socio-economic status carry a higher risk of ischemic heart disease (IHD)[4] and also have a tendency towards unhealthy habits [1,3]. Work-related stress is the most widely studied chronic life stress relative to CHD. The Whitehall II study 10 years follow up showed that, compared to highest employment grade, men in the lowest employment grade had three times the mortality rate from CHD[5]. Although many aspects of work environment relative to the development of CAD have been studied, much interest has focused on models of stress at work: the Karasek job strain model and the »demand-control« model, defined by Theorell[6]. The Theorell model consists of psychological demands, job control and social support at the workplace. Siegrist's model views work stress as the outcome of high work demand and low reward[7], with job insecurity and job promotion prospect as key components. Extended follow up of the Whitehall II study showed that high demands were related to fatal CHD/non-fatal MI for men and women[8]. Some studies have found that low control at work was associated with CHD[9]. Almost all experts explain the pathogenesis of the link between psychosocial factors, work related stress and IHD by two different mechanisms: a behavioral mechanism and a direct mechanism. The be-

Received for publication April 21, 2006

havioral mechanism involves an unhealthy lifestyle (unhealthy food choices, smoking and sedentary lifestyle), while the direct mechanism acts through the activation of the hypothalamic-pituitary-adrenal axis. Through the axis, cortisol and catecholamines[1,3] are released, resulting in hyperresponsivity of the sympathetic nervous system[3]. Primate studies[10] have shown that chronic psychological stress lowers the HDL cholesterol levels due to heightened sympathetic nervous system activation. Another study showed that workers with high work demands and low rewards were at a 4.4-times higher risk of low HDL cholesterol[11]. Reduced HDL-lipid concentration would be unable to effectively eliminate the cholesterol excess at the vascular wall, contributing to the inflammatory phenomena that characterize the pathogenesis of atherosclerosis since its initial phases[12]. Generally psychosocial factors tend to cluster together, occurring in combination with the conventional risk factors on the IHD; however pathophysiological mechanisms of psychosocial factors remain unclear. Homocysteine (HCY) as a novel risk factor for atherosclerosis was studied in most case-control and prospective studies which proved an association between total plasma homocysteine concentration and cardiovascular disease in general population[13–16] but not in workers. Of these, two studies dealt specifically with active workforce: in the Brazilian study male shift working bus drivers showed significantly higher levels of plasma homocysteine than control group[17], while higher levels of homocysteine in connection to job strain were found in male workers in South Korea. Our study had two goals: to establish the effect of psychosocial work-related factors on conventional risk factors for IHD, particularly on lipid changes; and to establish the effects of psychosocial work-related factors on homocysteine levels in male workforce population in Slovenia.

Methods

This case-control clinical research was carried out at the Clinical Department of Cardiology of the Ljubljana Clinical Center and at the Institute of Occupational Safety between March 2003 and April 2005. The study was approved by the national Ethics Committee.

Selection of research subjects

As subject we have chosen employed men, aged 35–55, with a planned visit to specialist gastroenterologist or men that were admitted to the cardiology department (2160) on Wednesdays. Of all 2160 workers, 220 were randomly chosen to participate in our research as the control group. Members of the IHD group were randomly chosen from the cardiology department, taking into account age, employment status and an evidenced ischemic heart disease (presence of at least one significantly narrowed coronary artery proved by coronorography). Clinical phenomenal forms of ischemic heart disease included angina pectoris and acute myocardial infarction. The study excluded patients with chest pains due to other heart-related issues (e.g. cardiomiopathy, heart valvular disease, myocarditis, pericarditis), as well as diabetic patients. Five patients did not consent to giving a blood sample for homocysteine testing, while seven lacked the complete records of conventional risk factors and homocysteine. With these 12 eliminated, the study group consisted of 86 patients. The Control group was formed in the same way (out of patients randomly selected on the same days of the week as the individuals for the IHD Group) and consisted of 122 individuals without IHD. Inclusion criteria included the absence of ischemic heart pains. Clinical forms of ischemic heart disease were ruled out using a normal ECG, by checking the medical records of 92 individuals and performing a coronorography for 30 individuals with non-typical chest pains that showed normal coronary arteries. Six patients did not consent to giving a blood sample for homocysteine testing, and 10 lacked the complete records of conventional and psychosocial risk factors. Exclusion criteria were the same as for the IHD Group. Ultimately the control group consisted of 106 individuals. All the coronorographies were carried out at the Ljubljana Clinical Center.

Data on the conventional risk factors of the study participants were obtained by:

- a questionnaire regarding the patients' physical activity, alcohol consumption and smoking habits, family history of heart attack, intake of black bread and vegetables (lower than 2–4 times per week), pharmacological treatment with B-vitamin, abuse of drugs for lipids and hypertension during last year
- measurements of blood pressure, hip-waist dimension, body weight, body height and calculations of Body Mass Index (BMI)
- blood testing for total cholesterol, LDL and HDL cholesterol, homocysteine and triglycerides

All subjects that smoked more than 1 cigarette per day were defined as smokers. Alcohol intake was included in the analyses if subjects drank more than 1 unit of alcohol per day, four times or more/week. Physical activity was defined with frequency of moderate activity per week.

Blood samples were collected from subjects after a six hour fast in the morning time, into tubes containing 0.1 % EDTA. The tubes for the analysis of the homocysteine were kept cool by ice; blood underwent a 15 to 30 minute 2000 rpm centrifuge, was then stored at –20 °C and later (in one-two weeks) analyzed for the level of total homocysteine with an AxSYM fluorescence polarization immunoassay apparatus (Abbott) Clinical Center of Ljubljana. Plasma was isolated in the other tubes for the analyses of total cholesterol, triglycerides (by enzyme colorimetric methods), HDL-cholesterol (homogenize enzyme colorimetric method), and LDL-cholesterol was calculated. In workers that took part in the study between April 2004 and April 2005, the concentration of inflammation parameters high sensibility

C-reactive protein (CRP) and interleukin-6 (IL-6) was measured as well. These measurements involved 32 pa-

tients from the IHD Group and 32 from the Control Group. Luminometric immunoassay (DPC Corporation Los Angeles, CA, USA) was used for the measurement of the concentration CRP and IL-6 in serum. The analysis was not carried out for workers taking part at the beginning of the study (March 2003 to April 2004), as by then the plasma has been kept refrigerated for too long.

Psychosocial characteristics

The data on the socio-economic status was obtained using the University of Ljubljana, Faculty of Social Sciences, Institute of Social Sciences, Public Opinion and Mass Communication Research Center 1999 questionnaire.

Participants were queried on their occupational category: 1) leading employees (employers, heads of various departments, general managers with less or more than 10 employees), 2) workers (qualified, semi-qualified and unqualified workers) and 3) others (specialists, high level employees, medium or lower level clerks). The question whether their income at the time of research was higher or lower than the national average was answered by a »yes« or »no«. Participants were also queried on their daily average time of work (hours) and for how long they have been employed at their current job.

The self reported items of psychological demands, job control and social support at work were assessed by a questionnaire based on the Theorell model[8] and already used on the Slovenian workforce population (appendix)[19]. The original questionnaire by Theorell was translated into Slovene and it has been modified adding two questions for job control: Does your job provide you with variety and interesting things? Am I autonomous concerning my work? It was then tested on 484 Slovenians. Pearson's correlation coefficients between Theorell's questionnaire and modified questionnaire were the following: job demands r=0.77; job control r=0.74; social support r=0.88. All the workers filled in the questionnaire by marking individual scores for each question. Psychological demands (five items), job control (eight items) and social support (six items) were assessed and later summed – questions were evaluated using a four point scale for all questions.

To improve our assessment of the significance of psychosocial factors for IHD, which has already been reported by previous studies[20], two questions regarding job security and job promotion prospects from the Siegrist model[7] were included in the questionnaire. Participants rated their job security and promotion prospects on a five-level scale from strongly agree, agree, not sure, disagree, and strongly disagree. Only the »disagree« and »strongly disagree« answers were included in the statistical analysis. Participants filled out the questionnaire one day after their coronorography, while those from dispensaries did so on the day of their examination. Participants were not notified of the study in advance.

Statistical analysis

To describe the normally distributed values of both groups' variables (age, blood pressure, body mass), arithmetic mean and standard deviation were used. In the cases, where values were not distributed normally, median and interquartile range were used instead. All other variables were described by frequency.

The difference between both groups of participants was ascertained using the Student t-test for the normally distributed variables, while the Mann-Whitney U-test was used for the others. The association between independent psychosocial factors and IHD incidence was evaluated using multiple logistic regressions, after being adjusted for independent factors (leadership jobs, smoking, homocysteine, and LDL and HDL cholesterol). The age was also taken into account as the two groups were of a significantly different age. All the calculations were performed using the SPSS (version 12.0.1) statistical software for Windows

Results

Age and socio-economic status and psychosocial work-related factors of both the Control Group and the IHD Group are shown in Table 1.

The two groups were significantly different in age composition and number of leading employees. The IHD Group analysis showed significantly higher physical demands, lower job control and lower social support at the workplace, poor job promotion prospects as well as poor job security. The significance of poor job promotion prospects and job security was confirmed by a bi-variable regressive analysis, but not by a multi-variable regressive analysis. The groups did not differ significantly in their average income, average length of the workday, time working at current job or education.

Conventional coronary risk factors (Table 2) of the Control Group and the IHD Group differed significantly in regards to cholesterol-HDL, triglycerides, smoking and index hip-waist. In the IHD Group, smoking and triglycerides were significantly higher, while the level of »good« cholesterol-HDL was lower than in the Control Group. The body mass index did not differ between the groups. The two groups did not display a significant difference in levels of total cholesterol or cholesterol-LDL. Furthermore, no significant difference was indicated in arterial blood pressure, physical activity, homocysteine or family history of IHD. The IHD Group was found to have taken antihypertensive (44% vs. 24%) and antilipemic drugs (41% vs. 17%) much more frequently than the Control Group, therefore no significant difference was found in their total cholesterol levels and systolic and diastolic blood pressure. Despite the medicine, HDL cholesterol had an important effect on IHD. The IHD Group consumed more alcohol, but the difference was not significant (p=0.098). Homocysteine levels of both groups were within physiological limits (5–15 ± 5.7 μmol/L [19]) and there were no significant differences. The study ruled

TABLE 1
SOCIO-ECONOMIC STATUS AND PSYCHOSOCIAL WORK-RELATED FACTORS OF BOTH GROUPS. THE VALUES SHOWN ARE EITHER THE FREQUENCY (%), THE ARITHMETIC MEAN (STANDARD DEVIATION) OR THE MEDIAN VALUE (INTERQUARTILE RANGE)

Variable	Control Group (n=106)	IHD Group (n=86)	p
Age	47.7 (5.7)	50.4 (4.4)	< 0.001
Occupational category (leading employees)	13 (12.3 %)	20 (23.3 %)	0.045
Total employment time (year)	13 (6.7–25)	12 (6–21.2)	0.644
Income/month (lower than average)	38 (36.2 %)	36 (41.9 %)	0.424
Education (<12 years)	18 (23.4 %)	19 (22.1 %)	0.471
Length of workday in hours	10 (9–12)	10 (8.7–12)	0.872
Psychological demands (points)	15 (13–16)	16 (14–17)	0.014
job control (points)	26 (23–28)	25 (20–27)	0.012
Social support at work (points)	19 (17–21)	18 (16–20)	0.025
Poor job security	13 (12.3 %)	29 (33.7 %)	< 0.001
Poor job promotion prospect	50 (47.2 %)	59 (68.6 %)	0.003

out the factors that are known to increase homocysteine levels: renal disease, diabetes, pernicious anemia, hypothyroidism, psoriasis, abuse of oral contraceptives, anticonvulsive drugs and metformin. Since they were not under examination, the possible effects of coffee, omeprazol and genetic factors could not have been ruled out.

Most interesting was the mean concentration of CRP in the IHD Group was 9.1 mg/L and was significantly higher than in the Control Group 1.8 mg/L ($p < 0.01$). Results for IL-6 showed similar pattern; the mean concentration was 6.5 ng/L in the IHD Group and 1.6 ng/L in the Control Group ($p < 0.01$). This supports the idea of an important role of inflammation in IHD development. The results were not included in the multifactorial analysis, as the analysis of CRP and IL-6 was only carried out for 64 patients out of 192.

Multivariate analysis showed that the probability for the onset of IHD is about 3.9 times higher for individuals with leadership jobs (OR 3.97; 95% CI 1.24 to 12.79). Probability of IHD development is also higher for older participants (OR of 1.15; 95% CI 1.06 to 1.26), participants with increased levels of LDL cholesterol (OR of 1.65; 95% CI 1.19 to 2.30) and for those with psychologically demanding jobs (OR of 1.25; 95% CI 1.04 to 1.51). A significant difference between the two groups was also discovered in their HDL cholesterol rates (OR of 1.64; 95% CI 1.37 to 1.97, for interval of 0.1 mmol/L). Furthermore, participants with low work control were 1.23 times more likely to develop IHD (OR 1.23; 95% CI 1.09 to 1.39), and smokers 2.2 times more likely than non-smokers (OR 2.22; 95% CI 0.98 to 5.03). The significance of homocysteine as an IHD risk factor was found to be borderline ($p = 0.056$). Due to this fact, the interaction between homocysteine, smoking and job control was tested for by a deviance test in the model of multiple logistic regression. The effect of smoking and job control on IHD was

TABLE 2
CONVENTIONAL IHD RISK FACTORS. VALUES SHOWN ARE EITHER THE FREQUENCY (%), THE ARITHMETIC MEAN (STANDARD DEVIATION), OR THE MEDIAN VALUE (INTERQUARTILE RANGE)

Variable	Control Group (n=106)	IHD Group (n=86)	p
Total cholesterol (mmol/L)	5.70 (1.22)	5.76 (1.57)	0.720
Cholesterol LDL (mmol/L)	3.3 (2.6–4.0)	3.5 (2.6–4.2)	0.527
Cholesterol HDL (mmol/L)	1.4 (1.1–1.6)	1.0 (0.9–1.2)	< 0.001
Triglycerides (mmol/L)	1.5 (1.0–2.4)	1.9 (1.4–2.6)	0.005
Homocysteine (μmol/L)	10.4 (8.9–11.3)	10.0 (8.6–11.1)	0.149
Systolic blood pressure (mm Hg)	132.2 (16.4)	133.2 (18.2)	0.708
Diastolic blood pressure (mm Hg)	84.0 (10.0)	83.3 (12.4)	0.659
Smoking (yes)	32 (30.2 %)	47 (54.7 %)	0.001
Alcohol (4 times per week or more)	9 (8.5%)	14 (16.3 %)	0.098
Physical activity (at most once per week)	32 (30.2 %)	31 (36.0 %)	0.390
Family history of CHD (yes)	25 (23.6 %)	28 (32.6 %)	0.167
Body mass index kg/m^2	27.5 (3.4)	28.5 (3.5)	0.059
Index hip-waist	0.95	0.98	0.001

TABLE 3
RESULTS OF THE MULTIVARIATE REGRESSION ANALYSIS

Variable	Regression coefficient b	Standard margin of error b	p	ORs	Bounds of the 95% confidence interval	
Cholesterol LDL(mmol/L)	0.505	0.169	0.003	1.65	1.19	2.30
Cholesterol HDL *(mmol/L)	–4.964	0.918	< 0.001	0.61	0.51	0.73
Homocysteine(μmol/L)	–0.129	0.067	0.056	0.87	0.77	1.00
Psychological demands	0.228	0.095	0.016	1.26	1.04	1.51
Low Work Control	–0.213	0.062	0.001	0.81	0.72	0.91
Age	0.147	0.043	0.001	1.16	1.06	1.26
Smoking	0.801	0.416	0.054	2.23	0.99	5.03
Occupational category (leaders)	1.381	0.596	0.021	3.97	1.24	12.79

Hosmer-Lemeshow test: χ^2=6.39; p=0.604,

*OR in CI was calculated for interval 0,1 mmol/L.

Because the Regression coefficient b are negative, an OR can be calculated 1/0.81 = 1.23; 95% CI 1.09 to 1.39, for those with low work control, their IHD risk is 1.23 times higher. Similarly OR for HDL-cholesterol was 1.64; 95% CI 1.37 to 1.97 for those with low HDL cholesterol and OR for homocysteine was 1.15; 95% CI 1.00 to 1.29, for those with low homocysteine.

found to be no higher even with increased homocysteine levels and the interactions not to be statistically significant.

Discussion

As expected, our research confirmed the importance of conventional risk factors in the development of IHD. It also confirmed the influence of several psychosocial workplace factors, particularly psychological demand and low job control – showing them to be independent IHD risk factors. Our results are in agreement with the findings of similar research in developed European countries[2–4,7,20,21–24] as well as in transitional countries[25,26]. Higher psychological demands of the IHD group may be explained by the participants' job descriptions as they were more likely to have leadership jobs. Such a result resembles the findings of the Lithuanian study which discovered a higher myocardial infarction risk in leading managers and maintenance personnel than in merchants and craftsmen[26]. A recent Swedish study of 58 managers found a connection between high LDL cholesterol, low HDL cholesterol and job strain[27]. The influence of low job control on IHD in the IHD Group was mostly the result of lower skill discretion. The average skill discretion value (appendix, items for job control from one to five) in the IHD Group was 14.43 points out of 20, as opposed to 15.59 in the Control Group. The link between socio-economic status and the risk of myocardial infarction through skill discretion has already been shown by a Danish study carried out in Copenhagen[28]. The final model of multi-variable regressive analysis included conventional IHD risk factors, psychosocial work-related factors, occupational category, age and novel risk factors – homocysteine (Table 3). It showed that psychosocial factors interact synergistically with conventional IHD risk factors.

Similar results have been found in prior studies, but they dealt with the connection between job strain and low cholesterol-HDL[29] and the connection between low socio-economic status and low cholesterol-HDL[3], while the subject of our investigation was the interaction of psychosocial and conventional factor and their combined influence on IHD, which was confirmed with coronorography. Higher sympathetic nervous activation retards the activity of lipoprotein lipase[30], a lower HDL cholesterol level is linked to a less efficient removal of excess cholesterol from blood vessel walls, and HDL cholesterol contributes to inflammation processes[12]. The IHD Group showed a significantly lower HDL cholesterol level and higher CRP and IL –6 levels (though these were only analyzed for 64 out of 192 participants), which suggests a possible link between psychosocial factors and atherosclerotic inflammations. The IHD group had higher demands, lower job control, held leadership positions and therefore performed more stressful work, had significantly poorer promotion prospects as well as poor job security, which could have resulted in a heightened sympathetic nervous system activation. The IHD Group did not differ from the Control Group in average education, income, time working at the current job or length of workday, which again suggests that the influence on IHD was due to the specific nature of their work. Participants in the IHD group also smoked more and had a higher BMI and hip-waist index. This may have been the result of heightened sympathetic activation (due to job stress) that modified lipid metabolism[1,3,31], and cause unhealthy nutrition[32]. Increased levels of triglycerides may be (Table 2) connected to higher BMI and hip-waist index in the IHD Group. Laboratory and clinical research has shown a linear connection between components of the metabolic syndrome (waist circumference, HDL cholesterol, triglycerides) and five-minute recordings of heart rate variability (HRV), which is used to estimate the autonomous nervous system activity[31].

The average homocysteine concentration in both groups remained within physiological plasma concentra-

tions (10.0 and 10.4 μmol/L, Table 2), and it was not elevated in IHD Group as we expected. Similar results have been reported by the Swedish general population study, individuals under observation displayed a homocysteine concentration of 11.4 μmol/L at the time of their infarction, while the control group showed 10.7 μmol/L[13]. Most studies report increased HCY levels in the IHD population[13-16]. Not enough research has been done regarding the effects that low homocysteine levels can have on atherosclerosis. It is possible that homocysteine coupled with other risk factors has an influence on IHD, as shown by our study and others[33] No participants took drugs of the vitamin B family in the year before participation. Control Group participants consumed more black bread and legumes (31%) than the IHD Group (17%), but no significant effect on homocysteine values was found (homocysteine levels could have been lower in the Control Group because vitamins of the B group decrease HCY). We have not gathered any data on fibrates drugs that could have increased HCY levels. On the other hand, antilipemic use was higher in the IHD Group, which should have caused a higher HCY, but this was not the case. HCY should also have been raised by the IHD Group participants' higher alcohol consumption (4 times or more per week), but it wasn't; thus it is possible that moderate drinking has no significant effect on HCY. HCY was found to be raised by fat consumption and smokers have been found to consume more fat and meat products that increase HCY as well[34]. Our study could not confirm the link between smoking and HCY, but showed a possible effect of unhealthy nutrition (IHD Group probably consume more fat).

Only a single previous study of the connection between psychosocial factors and homocysteine in the workforce also concerned itself with the link between work demands, decision latitude and HCY. It showed that decision latitude is closely connected to cholesterol, triglyceride and homocysteine levels[12]. The results of our study do not confirm the link between psychosocial factors and homocysteine, though they do suggest that lower concentrations of homocysteine (10 μmol/L) are a risk factor for IHD.

Conclusions

A low job control, high psychological demands and leadership positions are in interaction with low HDL cholesterol, frequent smoking, and higher BMI and hip-waist index. Our study suggests a possible of influence psychosocial work-related factors on low value of HLD-cholesterol probably due-to heightened sympathetic nervous system. No connection between psychosocial factors and higher levels of homocysteine was found, though the latter was shown to be a significant IHD risk factor at lower values around 10 μmol/L.

REFERENCES

1. ROZANSKI A, BLUMENTHAL J, KAPLAN J, Circulation, 99 (1999) 2192. — 2. MARMOT M, Epidemiology of Socioeconomic Status and Health. Are Determinations Within Countries the Same as Between Countries? In: ADLER NE, MARMOT M, McEWEN BS, STEWART J, Socioeconomic Status and Health in Industrial Nations, Social Psychological and Biological Pathways. (The New York Academy of Sciences, New York, 1999). — 3. PICKERING T, Cardiovascular Pathways: Socioeconomic Status and Stress Effect on Hypertension and Cardiovascular Function. In: ADLER NE, MARMOT M, McEWEN BS, STEWART J, Socioeconomic Status and Health in Industrial Nations Social, Psychosocial, and Biological Pathways. (The New York Academy of Sciences, New York, 1999). — 4. MARMOT M, BOSMA H, HEMINGWAY H, BRUNNER EJ, STANSFELD S, Lancet, 350 (1997) 235. — 5. MARMOT M, SHIPLEY MU, ROSE G, Lancet, 1 (1984) 1003. — 6. THEORELL T, The demand--control-support model for studying health in relation to the work environmental. An interactive model. In: ORTH-GOMER K, SCHNEIDERMAN N, Behavioral medicine approaches to cardiovascular disease prevention. (Erlabaum, New Jersey, 1996. — 7. SIEGRIST J, J Occup Health Psychol, 1 (1996) 27. — 8. KUPER M, MARMOT MG, J Epidemiol Community Health, 57 (2003) 147. — 9. BOSMA H, MARMOT MG, HEMIGWAY H, NICHOLSON AC, BRUNER E,. STANSFELD SA, BMJ, 314 (1997) 558. — 10. NIAURA R, HERBERT PN, ERVIN F, PALMOUR R, Ann Behav Med Supp, 15 (1993) 844. — 11. KOBAYASHI Y, HIROSE T, TADA Y, TSUTSUMI A, KAWAKAMI N, J Occup Health, 3 (2005) 201. — 12. SAMPIETRO T, BIGAZZI F, DAL PINO B, PUNTONI M, BIONDA A, Ital Heart J Suppl, 6 (2005) 341. — 13. HULTDIN J, THOGERSEN AM, JANSSON JH, NILSSON TK, WEINEHALL G, HALLMANS, J Inter Med, 6 (2004) 491. — 14. UELAND PM, REFSUM H, BERSFORD SAA, VOLLSET SE, Am J Clin Nut, 2 (2000) 234. — 15. NYGARD O, NORDREHAUNG JE, REFSUM H, UELAND PM, FARSTAD M, VOLLSET SE, N Eng J Med, 337 (1997) 230. — 16. SCHINI-KERTH VB, Circulation Rasearch, 93 (2003) 271. (editorials). — 17. MARTINS PJF, D'ALMEIDA V, VERGANI N, PEREZ ABA, TUFIC S, Occup Environ Med, 60 (2003) 662. — 18. KANG MG, KOH SB, CHA BS, PARK JS, BAIK SK, CHANG SJ, Prev Med, 5 (2005) 583. — 19. RATKAJEC T, The influence of the psychosocial factors at work on risk of myocardial infarction in working men in Slovenia. In: Book of Abstract (27th International Congress on Occupational Health, Iguassu Falls, 2003). — 20. PETER R, SIEGRIST J, HALLQVIST J, REUTERWALL C, THEORELL T, J Epidemiol Community Health, 56 (2002) 294. — 21. KUPER H, MARMOT M, J Epidemiol Community Health, 57 (2003) 147. — 22. HAMMER N, ALFREDSSON L, JOHNSON JV, Occup Environ Med, 55 (1998) 548. — 23. GUSTAVSSON P, ALFREDSSON L, BRINNBERG H, HAMMAR N, JAKOBSSON R, REUTERWALL C, OSTLIN P, Occup Environ Med, 53 (1996) 235. — 24. BELKIC KL, LANDSBERGIS PA, SCHNALL PL, BAKER D, Scand J Work Environ Health, 2 (2004) 85. — 25. BOBAK M, HERTZMAN C, SKODOVA Z, MARMOT M, Epidemiology, 9 (1998) 43. — 26. MALINAUSKIENE V, THEORELL T, GRAZULEVICIENE R, MALINAUSKAS R, AZARAVICIENE A, J Epidemiol Community Health, 58 (2004) 131. — 27. BERNIN P, THEORELL T, SANDBERG CG, Integr Physiol Behav Sci, 2 (2001) 121. — 28. ANDERSEN I, BURR H, KRISTENSEN TS, GAMBORG M, OSLER M, PRESCOTT E, DIDERICHSEN F, Occup Environ Med, 61 (2004) 886. — 29.ALFREDSSON L, HAMMAR N, FRANSSON E, de FAIRE U, HALLQVIST J, KNUTSSON A, NILSSON T, THEORELL T, WESTERHOLM P, Scand J Work Environ Health, 4 (2002) 238. — 30. NIAURA R, STONEY CM, HERBERT PN, Biol Psychol, 34 (1992) 1. — 31. HEMIGWAY H, SHIPLEY M, BRUNNER E, BRITTON A, MALIK M, MARMOT M, Circulation, 111 (2005) 3071. — 32. CHANDOLA T, BRUNNER E, MARMOT M, BMJ 2006; 332: 521. — 33. QUJEQ D, OMRAN TS, HOSINI L, Clin Biochem, 2 (2001) 2. — 34. OSHAUG A, BUGGE KH, REFSUM H, Eur J Clin Nuts, 52 (1998) 7.

T. Ratkajec

Occupational Health Service Rogaska, Celjska cesta 10, 3250 Rogaška Slatina, Slovenija
e-mail: tihomir.ratkajec@mf.uni-lj.si

UTJECAJ PSIHOSOCIJALNIH, S RADOM POVEZANIH, ČIMBENIKA NA UOBIČAJENE RIZIČNE ČIMBENIKE ISHEMIJSKIH SRČANIH BOLESTI I HOMOCISTEIN KOD SLOVENSKE MUŠKE RADNIČKE POPULACIJE

S A Ž E T A K

U ovom se radu proučava utjecaj psihosocijalnih, s radom povezanih, čimbenika na uobičajene rizične čimbenike ishemijskih bolesti srca (IHD), posebice na promjene lipida i njihov učinak na homocistein. Zaposleni muškarci u dobi od 35 do 55 godina s anginom pectoris ili s infarktom miokarda (IHD skupina) uspoređeni su sa skupinom pojedinaca bez ishemične bolesti srca (kontrolna skupina). Psihosocijalni čimbenici procijenjeni su korištenjem švedskog Theorell upitnika. Ustanovljeno je da IHD skupina ima veći rizik od IHD-a zbog većih zahtjeva na poslu (OR = 1,25), lošije kontrole posla (OR = 1,23), čestog pušenja (OR = 2,2), vodećih pozicija (OR = 3,97), većeg indeksa tjelesne mase (BMI) (p = 0,059) i višeg nivo triglicerida (P = 0,005) i LDL-kolesterola (OR = 1,65). Razina HDL-kolesterola bila je značajno niža (1,0 vs. 1.4 mmol/L, p < 0,001, OR = 1,64), dok je razina C-reaktivnog proteina (9,1 vs. 1,8 mg/L) i interleukina-6 (6,5 vs. 1,6 ng/L) bila viša. Razine homocisteina su pokazale graničnu vrijednost (p = 0,056). Naša studija ukazuje na mogući utjecaj psihosocijalnih čimbenika povezanih s radom na rizik od ishemijskih bolesti srca (IHD), ponajviše na nizak HDL-kolesterol. Nije pronađena veza između psihosocijalnih čimbenika i razina homocisteina, za koji se pokazalo da je IHD rizični čimbenik na nižim razinama od otprilike 10 μmol/L.

Appendix

Psychological demands, job control and social support are assessed my means of 19 items. Five items for job demands were

1. Do you have to work very fast?
2. Do you have to work very intensively (too much work)?
3. My job requires working accurately?
4. Do you have enough time to do everything?
5. Do different groups at work demands things from you, which causes conflict?

The eight items for job control were.

1. Do you have the possibility of learning new things through your work?
2. Does you work demand a high level of skill or exertise?
3. My job requires that I be creative?
4. Do you have to do the same thing over and over again?
5. Does your job provide you with variety and interesting things?
6. Do you have a choice in deciding how you do your job?
7. Do you have a choice in deciding what you do at work?
8. I am autonomous concerning my work?

Six items were for social support

1. People I work with are helpful in getting the job done.
2. People I work with take a personal interest in me.
3. People work with are friendly.
4. People I work with are competent in doing their jobs.
5. My supervisor pays attention to what you are saying.
6. My supervisor is successful in getting people to work together.