STUDY ON HYPERTENSION PREVALENCE IN MEDICAL STAFF FROM A ROMANIAN ACADEMIC EMERGENCY COUNTY HOSPITAL

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Abstract: *Hypertension is one of the most important cardiovascular risk factors. Study objective was to quantify the prevalence of hypertension in medical staff and identify factors that influence blood pressure. Blood pressure, body mass index (BMI), waist-hip ratio (WHR), blood glucose, total cholesterol (TC), HDL and LDL cholesterol, triglycerides and questionnaires on work ability, emotional exhaustion and fatigue of 300 employees (doctors, nurses, nursing assistants, janitors and other medical staff) of a Romanian clinical emergency hospital were analyzed. Prevalence of hypertension was 30%; awareness level was 51.1%. Hypertension was significantly associated with gender, BMI ≥ 25 mg/m2, abdominal obesity, TC ≥ 200 mg/dl, LDL cholesterol ≥ 130 mg/dl, triglycerides ≥ 150 mg/dl, age and seniority (p<0.001), and with occupational category (p<0.01). Prevalence of hypertension in medical staff, although below national and European level, is important. Physicians have high hypertension prevalence. Accumulation of risk factors increases cardiovascular risk in medical staff.*

Cuvinte cheie: *risc cardiovascular, tensiune arterială, indice de masă corporală, colesterol, medic, asistentă medicală, vechime în muncă*

Rezumat: *Hipertensiunea arterială este unul dintre cei mai importanţi factori de risc cardiovascular. Obiectivul studiului a fost cuantificarea prevalenţei hipertensiunii la personalul medical şi identificarea factorilor care influenţează valorile tensiunii arteriale. Au fost analizate tensiunea arterială, indicele de masă corporală (IMC), indicele talie-şold, glicemia, colesterolul sanguin total (TC), fracţiunile HDL şi LDL, trigliceridele şi chestionare privind indicele capacităţii de muncă, epuizarea emoţională şi oboseala subiectivă, la un număr de 300 de angajaţi ai unui spital clinic de urgenţă din România: medici, asistente medicale, infirmiere, îngrijitoare de curăţenie şi alt personal medical. Prevalenţa hipertensiunii a fost de 30%, nivelul de conştientizare a fost de 51,1%. Hipertensiunea s-a asociat semnificativ cu sexul, IMC ≥ 25 mg/m2, obezitatea abdominală, TC ≥ 200 mg/dl, LDL-C ≥ 130 mg/dl, trigliceride ≥ 150 mg/dl, cu vârsta şi vechimea în ocupaţia actuală (p<0,001) şi cu categoriile ocupaţionale (p<0,01). Prevalenţa hipertensiunii arteriale la personalul medical, deşi sub valoarea celei naţionale şi europene, este importantă. Medicii au o prevalenţă ridicată a hipertensiunii arteriale. Cumulul de factori de risc creşte riscul cardiovascular la personalul medical.*

INTRODUCTION

Arterial hypertension (HT) is one of the most important cardiovascular risk factors, responsible for 13% of deaths from known causes worldwide.(1) Approximately 40% of adults over 25 years were diagnosed with hypertension in 2008; hypertensive population grew at more than two thirds over nearly three decades (1980-2008)(2). It is estimated that by 2025 the number of people suffering from hypertension will increase to 1.5 billion.(3) In coming years, if the trend of increasing cases of cardiovascular diseases, hypertension included, is maintained at the same rate, the economic losses involved with these diseases will greatly exceed public spending on health, particularly in low and middle income countries.(2) Consequences of hypertension: ischemic heart disease and stroke, account for 9.4 million deaths annually (4), figure that directly impacts the socio-economic balance of the affected population, viewed in terms of basic social form - the family - but also from the broader perspective of pressure on those countries' gross domestic product.

At European level, prevalence of hypertension exceeds by 60% the figures for the United States and Canada.(5) In Europe, hypertension is at the origin of 25% of acute myocardial infarction cases and of 42% of annually reported deaths.(6) As expected, the solution considered in the " Action Plan for implementation of the European Strategy for the Prevention and Control of Noncommunicable Diseases 2012−2016" of the Regional Office for Europe of the World Health Organization (WHO) is to reduce cardiovascular risk in populations in which it is expressed and not only to focus on treating cases of illness.(7,8)

In Romania, the WHO estimates for 2008 noted a high prevalence of 49.1% (49.5% in men and 45.5% in women).(9) According to the latest data from the Romanian National Statistics Institute, in 2010 family physicians recorded nearly a million new cases of cardiovascular diseases, which represent over 4% of the population, and 716,000 patients with cardiovascular disease were hospitalized, this group of diseases ranking first in the total number of hospitalized conditions hierarchy, with a percentage of 14.4.(10) Statistics from the Canter for Research and Evaluation of Health Services of the National School of Public Health, Management and Professional Development in Bucharest, covering indicators from the year 2012, achieved by hospitals reimbursed on rate of solved cases, and calculated based on data reported by hospitals in Romania

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for cases discharged during the period 01.01.2012-31.12.2012 (11), shows, for cardiovascular diseases, over 3.6 million hospital days, of which 85% were for acute cases. Of the cases admitted during 2012, the source reports, only for hypertension, without its complications, over 72,000 hospitalized cases. The first epidemiological study for the assessment of hypertension prevalence in Romania - SEPHAR (Study for the Evaluation of Prevalence of Hypertension and Cardiovascular Risk in Romania) confirmed Romania's position among countries with high cardiovascular risk (12,13), finding an overall HT prevalence of 44.92%.

Increase in HT prevalence has individual causes: unbalanced diet, physical inactivity, alcohol consumption, and global determinants: world population growth and aging. Exposure to stress is one of the living and working environment factors that may cause lasting changes in blood pressure. As hypertension is a disease of the adult population, exposure to occupational stress may be a risk factor with significant share in the genesis and evolution of this disease. The medical staff is subject to a number of occupational factors generating stress. Alternating shift work, night work, increased responsibility and frequency of contingency and emergency situations are just some of the reasons why health workers face a complex of stressors that may contribute to cardiovascular pathology, HT implicitly, or can influence its course.

PURPOSE

The study aimed to quantify the prevalence of hypertension in the medical staff of a public hospital unit in Romania, of emergency and academic profile, and identify the factors that influence blood pressure, both individual factors and elements belonging to the working conditions and environment.

METHODS

The study was conducted in 2012 in an Academic Emergency County hospital from the Romanian public health network. We selected two groups of medical wards: "hot" wards (HW) - wards with intense medical and surgical activity - operating theatres: General Surgery, Gynecology, Orthopedics, Urology, Ophthalmology, ENT and Oral-Maxillofacial Surgery, Anesthesiology and Intensive Care Unit and the Emergency Unit, and "cold" wards (CW) - medical wards with lower neuropsychological load: Internal Medicine, Cardiology, Hematology and Medical Rehabilitation, Physical Medicine and Balneotherapy. Participants in the study were workers who participated in the annual occupational health examinations and followed all investigational procedures specified in the study protocol - a total of 300 employees: doctors, nurses, nursing assistants, janitors and other medical staff (orderlies, physiotherapists and medical registrars). Nursing assistants and janitors were taken as a single group, because, in most public health facilities in Romania, they perform the same kind of activity, in fact a combination of patient basic care and cleaning work.

Mean age of study participants was 43.6 ± 9.076 years (ages 25 to 69 years) with a gender ratio of ¼ (men/women). Half of participants were nurses (51.3%), doctors and nursing assitants-janitors group had approximately equal percentages (21% and 21.7), other staff categories representing 6% of the subjects. Participants' ratio by ward category polling was ⅔: 40.7% belonged to HW and 59.3% to CW.

A set of worker data were collected by self-administered questionnaires. "Work Ability Index" (WAI) questionnaire developed by the Finnish Institute of Occupational Health (14), and a questionnaire targeting emotional response to stress and long term fatigue, designed by combining the emotional exhaustion subscale of the "Maslach Burnout Inventory" (EE-MBI) (15) with the "Checklist Individual Strength Questionnaire" (CIS) (16), were used.

Anthropometric measurements were made to calculate body mass index (BMI = weight (kg) / height $(m)^2$) and waist-hip ratio (WHR = waist circumference (cm) / hip circumference (cm)). Overweight was defined as BMI between 25.00 and 29.99 kg/m^2, and obesity as BMI $\geq$ 30 kg/m^2. Abdominal obesity was defined as WHR $\geq$ 0.90 for men and WHR $\geq$ 0.85 for women, according to WHO recommendations (report on diabetes, 1999) (17).

Systolic and diastolic blood pressure (SBP and DBP) were measured with a sphygmomanometer ® Heine GAMMA G5, after a 5-10 minutes rest. SBP and DBP were classified into the categories defined by the 2007 joint guidelines of ESH (European Society of Hypertension) and ESC (European Society of Cardiology).(18) Hypertension was defined by values of SBP $\geq$ 140 mmHg and DBP $\geq$ 90 mmHg, including cases of isolated systolic hypertension. Smoking history and previous diagnosis of hypertension - defined as level of awareness, were recorded. The prevalence of hypertension was calculated by adding previously diagnosed to newly diagnosed cases discovered during the study. Blood samples were collected after a fasting period of 8-12 hours, and blood glucose, total cholesterol (TC), HDL and LDL cholesterol (HDL-C and LDL-C), and triglycerides (TGL) levels were determined.

Statistical analysis was performed using IBM SPSS Statistics 17.0 software. Descriptive data were analyzed: percentage for qualitative variables, the mean, standard deviation (SD) and standard error of mean (SEM) for quantitative variables. We used independent samples t-test, Pearson correlation coefficient and chi-square test for differences in qualitative data analysis.

RESULTS

Hypertension prevalence

Overall prevalence of hypertension in the study group was 30%, 23.9% among females and 53.2% in male subjects. 15.3% of the subjects were known hypertensive and awareness was 51.1%. HT prevalence was 44.4% in doctors, 22.7% in nurses, and 29.2% in the nursing assistant-janitor group.

Table no. 1. Hypertension prevalence by parameter category

	Hypertension *n* (%)	**Optimal, normal, high normal BP *n* (%)**	**Total N**	***P* (χ^2)**
Group	90 (30)	210 (70)	300	
Gender				< 0.001
Female	57 (23.9)	181 (76.1)	238	
Male	33 (53.2)	29 (46.8)	62	
Area of residence				
Urban	83 (31.3)	182 (68.7)	265	
Rural	7 (20)	28 (80)	35	
Marital status				
Unmarried	15 (31.9)	32 (68.1)	47	
Married	56 (27.1)	151 (72.9)	207	
Unmarried but cohabitating	2 (66.7)	43 (33.3)	3	
Divorced	11 (40.7)	16 (59.3)	27	
Widow/er	6 (37.5)	10 (62.5)	16	
Basic education				
Elementary school	2 (28.6)	5 (71.4)	7	

Comprehensive school	5 (83.3)	1 (16.7)	6	
Intermediate school	14 (73.7)	19 (26.3)	33	
Secondary school	68 (27.9)	176 (72.1)	244	
Other education	1 (10)	9 (90)	10	
Vocational /Professional education				
Vocational course for the unemployed	1 (100)	-	1	
Other course > 4 months	9 (39.1)	14 (60.9)	23	
Vocational school	15 (34.9)	28 (65.1)	43	
Vocational institute/college	26 (21.8)	93 (78.2)	119	
University	37 (34.9)	69 (65.1)	106	
Other training	2 (25)	6 (75)	8	
Wards group				
HW	52 (29.3)	126 (70.7)	178	
CW	38 (31.1)	122 (68.9)	122	
Occupational category				< 0.01
Physician	28 (44.4)	35 (55.6)	63	
Nurse	35 (22.7)	119 (77.3)	154	
Nursing assistant - janitor	19 (29.2)	43 (70.8)	65	
Other medical staff	8 (44.4)	10 (55.6)	18	
IBMI				< 0.001
≥ 25 kg/m^2	77 (43.3)	101 (56.7)	178	
≥ 30 kg/m^2	43 (55.8)	34 (44.2)	77	
WHR				< 0.001
Normal	34 (17.8)	157 (82.2)	191	
Abdominal obesity	56 (51.4)	53 (48.6)	109	
Glycemia				< 0.01
< 100 mg/dl	64 (26.4)	178 (73.6)	242	
≥ 100 mg/dl	26 (44.8)	32(55.2)	58	
TC				< 0.05
< 200 mg/dl	35 (23.3)	115 (76.7)	150	
≥ 200 mg/dl	55 (36.7)	65 (63.3)	150	
HDL-C				
< 40 mg/dl (men) and < 50 mg/dl (women)	28 (34.1)	54 (65.9)	82	
≥ 40 mg/dl (men) and ≥ 50 mg/dl (women)	62 (28.4)	156 (71.6)	218	
LDL-C				< 0.05
< 130 mg/dl	45 (24.3)	140 (75.7)	185	
≥ 130 mg/dl	45 (39.1)	70 (60.9)	115	
Triglyceride				< 0.01
< 150 mg/dl	60 (26.1)	170 (73.9)	230	
≥ 150 mg/dl	30 (42.9)	40 (57.1)	70	
Smoking				
Smoker	31 (36.5)	54 (63.5)	85	
Nonsmoker	59 (27.4)	156 (72.6)	215	
EE - MBI				
Low	51 (30)	119 (70)	170	
Moderate	26 (25)	78 (75)	104	
High	13 (50)	13 (50)	26	
CIS score				
< 76	84 (29.6)	200 (70.4)	284	
≥ 76 (long term fatigue)	6 (37.5)	10 (62.5)	16	
Work demands				
Mental	12 (37.5)	20 (62.5)	32	
Physical	7 (46.7)	8 (53.3)	15	
Mental and physical	71 (28.1)	182 (71.9)	253	
WAI				
Poor WA	-	-	-	
Moderate WA	9 (69.2)	4 (30.8)	13	
Good WA	26 (31.3)	57 (68.7)	83	
Excellent WA	55 (27)	149 (73)	204	

Hypertension was significantly associated with gender, overweight and obesity, abdominal obesity, hypercholesterolemia (TC ≥ 200 mg/dl), LDL-C ≥ 130 mg / dl and hypertriglyceridemia (TGL ≥ 150 mg/dl) (table 1), and also with age, seniority ($p < 0.001$) and occupational categories ($p < 0.01$).

Regarding the correlation level of parameters taken into account, there is a significant correlation of DBP with age, seniority, BMI, WHR, total cholesterol and triglycerides ($p < 0.001$) and a weaker correlation with glucose ($p < 0.01$) and HDL-C levels ($p < 0.05$) (table no. 2).

Hypertensive group structure

Demographic and socio-cultural characteristics

90 healthcare workers fell in one of the HT categories (30%). Most subjects qualified for class I HT (table 3). Hypertensive group structure was as follows: 63.7% of HT cases were women and 36.7% men, mean age of subjects was 48.8 ± 9.3 years, and 7.8% were in the 25-35 years age group, 24.4% in the 35-44 years age group, 37.8% in the 45-54 years age group, and 30% in the > 55 years age group. 92.2% lived in urban areas and 64.4% declared a life partner (marriage, cohabitation). 75.1% of subjects with hypertension completed high school (12 years) and 41.1% attended university.

Occupational characteristics, fatigue and self-evaluation of work ability

57.8% of hypertensive staff belonged to HW and 42.2% to CW. 31.1% were physicians, 38.9% were nurses, 21.1% were nursing assistants-janitors and 8.9% belonged to other medical staff. Mean seniority was 12.8 ± 18.2 years.

61.1% of hypertensive workers had excellent work ability and 78.9% had mixed work demands - physical and mental - (according to WAI questionnaire). 14.4% of hypertensive had high level of emotional exhaustion (EE - MBI) and 6.7% had high degree of long term fatigue (CIS).

Cardiovascular risk factors

34.4% of hypertensive healthcare workers were smokers. 85.5% of HT cases had BMI ≥ 25 kg/m^2 and 47.8% had BMI ≥ 30 kg/m^2. 62.2% of cases had abdominal obesity. 28.9% of hypertensive cases blood glucose was ≥ 100 mg/dl, 61.1% had TC ≥ 200 mg/dl, 31.1% had HDL-C < 40 mg/dl (men) and < 50 mg/dl (women), 50% an LDL-C ≥ 130 mg/dl, 33.3% had TGL ≥ 150 mg/dl and 44.4% had mixed dyslipidemia.

Table no. 2. Correlation of quantitative parameters

N = 300		Age	Seniority	BMI	WHR	Glycemia	TC	HDL-C	LDL-C	Triglyceride	SBP	DBP	EE – MBI score	CIS score	WAI score
Age	Pearson Correlation		.667**	.368**	.370**	.186**	.350**	.068	.077	.223**	.121*	.392**	-.022	.036	-.193**
	Sig. (2-tailed)		.000	.000	.000	.001	.000	.244	.181	.000	.036	.000	.702	.533	.001
Seniority	Pearson Correlation	.667**		.248**	.177**	.126*	.220**	.045	.057	.137*	.072	.223**	.026	-.068	-.122*
	Sig. (2-tailed)	.000		.000	.002	.029	.000	.433	.322	.018	.216	.000	.659	.238	.035
BMI	Pearson Correlation	.368**	.248**		.641**	.194**	.244**	-.220**	.109	.304**	.097	.511**	.028	.103	-.104
	Sig. (2-tailed)	.000	.000		.000	.001	.000	.000	.059	.000	.094	.000	.630	.076	.073
WHR	Pearson Correlation	.370**	.177**	.641**		.236**	.247**	-.394**	.112	.454**	.086	.486**	-.061	.099	-.026
	Sig. (2-tailed)	.000	.002	.000		.000	.000	.000	.052	.000	.135	.000	.293	.088	.658
Glycemia	Pearson Correlation	.186**	.126*	.194**	.236**		.077	-.078	.039	.101	.027	.166**	-.038	.101	-.060
	Sig. (2-tailed)	.001	.029	.001	.000		.181	.179	.500	.080	.641	.004	.512	.082	.304
TC	Pearson Correlation	.350**	.220**	.244**	.247**	.077		.153**	.380**	.361**	.018	.237**	-.062	.068	-.117*
	Sig. (2-tailed)	.000	.000	.000	.000	.181		.008	.000	.000	.759	.000	.281	.242	.043
HDL-C	Pearson Correlation	.068	.045	-.220**	-.394**	-.078	.153**		-.076	-.347**	-.067	-.117*	-.035	-.062	.051
	Sig. (2-tailed)	.244	.433	.000	.000	.179	.008		.188	.000	.246	.042	.551	.288	.375
LDL-C	Pearson Correlation	.077	.057	.109	.112	.039	.380**	-.076		.115*	.018	.089	.007	.045	-.019
	Sig. (2-tailed)	.181	.322	.059	.052	.500	.000	.188		.047	.755	.126	.903	.436	.748
Triglyceride	Pearson Correlation	.223**	.137*	.304**	.454**	.101	.361**	-.347**	.115*		.016	.216**	-.103	.003	.003
	Sig. (2-tailed)	.000	.018	.000	.000	.080	.000	.000	.047		.783	.000	.076	.960	.958
SBP	Pearson Correlation	.121*	.072	.097	.086	.027	.018	-.067	.018	.016		.276**	.111	.031	.000
	Sig. (2-tailed)	.036	.216	.094	.135	.641	.759	.246	.755	.783		.000	.054	.589	.997
DBP	Pearson Correlation	.392**	.223**	.511**	.486**	.166**	.237**	-.117*	.089	.216**	.276**		-.003	.032	-.085
	Sig. (2-tailed)	.000	.000	.000	.000	.004	.000	.042	.126	.000	.000		.959	.584	.140
EE – MBI score	Pearson Correlation	-.022	.026	.028	-.061	-.038	-.062	-.035	.007	-.103	.111	-.003		.502**	-.423**
	Sig. (2-tailed)	.702	.659	.630	.293	.512	.281	.551	.903	.076	.054	.959		.000	.000
CIS score	Pearson Correlation	.036	-.068	.103	.099	.101	.068	-.062	.045	.003	.031	.032	.502**		-.476**
	Sig. (2-tailed)	.533	.238	.076	.088	.082	.242	.288	.436	.960	.589	.584	.000		.000
WAI score	Pearson Correlation	-.193**	-.122*	-.104	-.026	-.060	-.117*	.051	-.019	.003	.000	-.085	-.423**	-.476**	
	Sig. (2-tailed)	.001	.035	.073	.658	.304	.043	.375	.748	.958	.997	.140	.000	.000	

Table no. 3. Quantitative characteristics of the study group in relation to hypertension

Characteristics	Hypertension	*n*	Mean	Standard deviation	Standard error of the mean
Age (years)	Yes	90	48.79	9.307	.981
	No	210	41.24	8.030	.554
Seniority (years)	Yes	90	18.23	12.774	1.346
	No	210	12.65	9.389	.648
BMI (kg/m^2)	Yes	90	29.9420	4.75786	.50152
	No	210	25.5835	4.93753	.34072
WHR	Yes	90	.8992	.09780	.01031
	No	210	.8076	.08806	.00608
Glycemia (mg/dl)	Yes	90	96.02	18.075	1.905
	No	210	88.28	11.752	.811
TC (mg/dl)	Yes	90	215.94	45.802	4.828
	No	210	198.60	39.154	2.702
HDL-C (mg/dl)	Yes	90	53.54	16.603	1.750
	No	210	58.17	16.172	1.116
LDL-C (mg/dl)	Yes	90	134.3722	38.50087	4.05835
	No	210	125.5449	109.74890	7.57339
Triglyceride (mg/dl)	Yes	90	149.13	115.319	12.156
	No	210	107.41	85.884	5.927
SBP (mmHg)	Yes	90	155.78	133.269	14.048
	No	210	114.50	11.455	.790
DBP (mmHg)	Yes	90	92.67	8.715	.919
	No	210	74.74	7.721	.533
EE-MBI score	Yes	90	17.62	9.701	1.023
	No	210	16.43	7.376	.509
CIS score	Yes	90	42.14	18.876	1.990
	No	210	39.79	16.944	1.169
WAI score	Yes	90	43.57	4.490	.473
	No	210	44.79	3.493	.241

DISCUSSIONS

Essential hypertension cumulates in its composite etiology genetic factors of complex and incompletely elucidated transmission (19,20), and a number of environmental and behavioural factors. Stress can induce fenill-ethanolamine-N-methyltransferase, which will act as a DNA methylase, with the effect of increasing autonomic response.(21) Neuropsychological overloading can affect blood pressure, and the medical staff gathers a cumulation of work environment factors that lead to neuropsychological load. General cardiovascular risk factors are adding: diet, sedentary lifestyle and smoking. Consequences of unhealthy diet and sedentary lifestyle are primarily overweight and obesity, also hypercholesterolemia or hypertriglyceridemia, which in turn are risk factors for hypertension.

Prevalence of hypertension in the study group did not exceed European level nor the WHO estimated prevalence for Romania or the one reported by the SEPHAR I study (12). However, direct comparison cannot be exact, because the present study covered different ages (between 25 and 69 years), of the occupationally active adult, leading to conclusion that frequency value is far from being low. The study group did not comply with an approximately equal gender proportion, because of unequal gender percentage found in orientation toward a medical career, especially nurse, nursing assistant and hospital janitor occupations, which overwhelmingly belong to women. This does not apply to physicians' profession, where the balance is more equilibrated, which explains the 44.4% frequency of hypertension among doctors. Besides, HT prevalence in males (53.2%) was comparable to data obtained by the SEPHAR study (50.17%) and to WHO estimates (49.5%). Different results were obtained for HT prevalence in women, which stands one third lower than that estimated by WHO or reported by SEPHAR I. The dissimilarity between genders cannot be explained by differences in mean age or seniority, but could be influenced by differently expressed risk factors: the greater share, by approximately 30%, of BMI $\geq$ 25 kg/m^2 and smoking in males. The influence of BMI on BP and cardiovascular mortality was quantified in several studies (22,23), including cohort analysis of the male physicians enrolled in the Physician's Health Study.(24)

Studies reporting HT prevalence in medical staff found significantly lower percentages: the Brazilian study of Sfreddo et al. (25), on a group of nurses and nursing assistants with a similar gender distribution, found an overall prevalence of 16%, but had a lower mean age of subjects, and concluded on an absence of relationship between night shift and hypertension. A study from the African continent reported similar low prevalence (17.5%), even though the group was much closer to the mean age and occupational structure reported in our study, but with a more balanced male/female ratio.(26) Weak influence of alternating shift work on hypertension was reported by the Finnish Twin Cohort (27), which followed-up a large population over a period of over 20 years, and found no correlation between alternating shifts and HT or cardiovascular morbidity. A study on a group of healthcare workers in Taiwan (28), with a mean age comparable to the one in our study group, found frequencies of hypertension in doctors and nurses of 10.9% and 6.1%, much lower than those we found. This can be explained by dietary habits and anthropometric characteristics particular to the Asian geographical area.

Compared to data from SEPHAR I, in which HT awareness was 44.26%, the level found in our study - 51.1%, shows minor difference, but compared to SEPHAR II results (69.5 %), the level is much lower.(29) Given the professional nature of the population group, we expected greater disease awareness. One explanation, similar to that of presenteeism, could be conscious ignoring of pathological condition or poor adherence to spontaneous medical examinations, which is specific especially to physicians and is certified by the 47% of new HT cases identified by the study, in this occupational

group. Equally, frequency of elevated blood pressure with manifest symptoms is low, and therefore alert level was low.

Hypertension association to overweight, high cholesterol, triglycerides, glucose and LDL-C levels indicates cardiovascular risk factors concentration and increased risk of major cardiovascular events in the studied group. However, hypertension was not significantly associated to wards group, indicating adaptation to dissimilar conditions of occupational exposure. Positive correlation between HT, DBP and seniority takes substrate in seniority-age correlation. Age, in turn, is linked with HT and DBP. Generally, medical professions are career options that the individual takes at a young age, therefore age and seniority have parallel increase. Relationship between age and hypertension has already been proven. Long term fatigue and work ability, investigated by questionnaires, had no significant influence on BP.

The significant association of hypertension with occupational categories is an important indicator of differences in occupation-specific neuropsychological load, particularly in doctors, and compels focus in developing preventive measures aimed at this particular medical profession. Doctors are the engine of decision and activity involving patient care. Moreover, in an emergency hospital that serves a large population, psychological, and sometimes physical, demands are particularly high, placing the physicians in extreme situations, in which they have to make fast crucial decisions and act simultaneously, they have to lead therapeutic teams of variable sizes and to communicate with families of critical condition patients. Other factor of occupational task overload is the turnover of patients, which in an emergency unit is significantly high. The hospital from which the study group was chosen is also an applied medical education unit. Although this apparently decreases burden, by interns' contribution to medical procedures, it actually increases occupational stress of senior physicians by adding teaching activities to their work and need of monitoring and coordinating the patient-related activities of young doctors. The increased HT prevalence among physicians shows that all these elements have an impact on their cardiovascular status.

In comparison with the Romanian hypertensive patient profile reported by SEPHAR II, differences are small and primarily related to new parameters: occupational risk factors - occupation, seniority, response to stress and long term fatigue, and work ability. These factors, besides occupation and seniority, did not significantly affect SBP or DBP, and were not associated with hypertension. This, on one hand, indicates a degree of adaptation of medical staff to occupational demands, which has positive repercussions on mental balance and thus on BP values. On the other hand, however, the degree of caution, expressed at the time of questionnaires filling, over direct, non-anonymous investigation, suggests the need for future reinvestigation of the population group ensuring anonymity, to increase compliance.

To make full link to results of the only comprehensive study on hypertension in Romania - SEPHAR, the hypertensive healthcare worker profile can be sketched, but completed with occupational data: 49 years old female nurse/nursing assistant-janitor, living in an urban area, at secondary education level (at least 12 years), married, nonsmoker, overweight or obese, with high levels of total cholesterol and LDL-cholesterol, with an over 15 years seniority, with mental and physical work demands and excellent work capacity.

The main contribution of this study to research data base lies in complex cardiovascular evaluation of medical staff. To our knowledge, it is the first study to investigate hypertension prevalence in healthcare staff in Romania. It is also among the few studies to combine simultaneous clinical, laboratory and questionnaire examinations aimed at quantifying hypertension and its relationship to an aggregate of cardiovascular and work-related risk factors in Romanian medical staff. However, a study with a larger number of subjects and a more balanced gender distribution would provide an increase in data precision, necessary to obtain an accurate picture of medical staff health status.

Directions for future research

To reach further conclusions on cardiovascular response to risk factors present in the working environment, research must be continued by extending the study group and the examinations base, the latter by adding a questionnaire to capture detailed occupational risk factors. It becomes necessary to develop a program on prevention and control of cardiovascular risk and hypertension in the workplace, to lead to increased awareness of risk and disease, to education for adopting healthy behaviours regarding diet and physical activity, and to better reporting of work conditions and work relations perception.

CONCLUSIONS

Prevalence of hypertension in medical staff, although below the national and European level, is important. Hypertension is significantly associated with overweight and obesity, with increased levels of total cholesterol, LDL-cholesterol and triglycerides, with occupational categories and seniority. Physicians have high prevalence of hypertension, similar to national and European prevalence, but the generic hypertensive health worker is represented by the nurse/nursing assistant-janitor. Accumulation of cardiovascular risk factors increases the risk of developing a major cardiovascular event.

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