

CARDIOVASCULAR RISK IN THE ACTIVE MILITARY POPULATION

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Abstract: The study included 920 active military persons, aged 20 – 55 years, in which the prevalence of cardiovascular risk factors was assessed. Arterial hypertension had a prevalence of 20.76% of the active military personnel, occurring at younger ages. The “normally high” arterial pressure also had a high prevalence, 28.26% of the whole group. High cholesterol levels were found in 58.48% of the subjects. Smoking was also frequent in the active military population, reaching 61.2%. The prevalence of diabetes mellitus was lower (2.39%) than in the general population – 5% according to the SEPHAR study (1), while overweight and obesity were similar with the normal population (52.6%). Stress was found to be very high in the active military population, reaching 89.67%, thus becoming a specific cardiovascular risk factor in this group.

Rezumat: Au fost luați în studiu un număr de 920 de militari activi cu vârsta cuprinsă între 20 și 55 de ani, la care s-a investigat prevalența factorilor de risc cardiovascular. Hipertensiunea arterială are o prevalență de 20,76% din populația militară activă și apare la vârste mai tinere. TA „normal înaltă” a avut de asemenea o prevalență crescută, atingând 28,26% pentru întregul lot de studiu. Hipercolesterolemia s-a înregistrat la 58,48% dintre subiecți. Prevalența fumatului a fost foarte crescută la populația militară activă, atingând cifra de 61,2%. Prevalența diabetului zaharat a fost inferioară (2,39%) celei din populația generală, care după Studiul SEPHAR fost de 5% (1), dar prevalența supraponderității și obezității (52,6%) a fost similară. Prevalența stresului este foarte ridicată în rândul populației militare active, atingând cifra de 89,67%, prin aceasta stresul devenind un factor de risc cardiovascular specific pentru acest grup populațional.

INTRODUCTION

Cardiovascular pathology, especially atherosclerotic, represents an important clinical and epidemiological research subject due to the high morbidity and mortality levels it entails. Numerous population studies associated with fundamental and clinical research led to a unified prophylactic concept based on the assessment of cardiovascular risk factors (2). Cardiovascular risk factors include elements that characterize healthy individuals, but are statistically associated with the possibility of future atherosclerotic cardiovascular disease (2,3).

Starting from this idea, prevention of cardiovascular disease (especially atherosclerotic) includes 3 types of strategies:

- *population strategy*, involving the control of risk factors at the level of the whole population (population primary prevention, consisting of the influence of life style and environmental factors);
- *risk group strategy*, which identifies risk factors in certain population groups and then attempts to control them (individual primary prevention);
- *secondary prevention strategy*, which controls risk factors in groups that already present atherosclerotic vascular diseases (3).

The study of the prevalence of risk factors in a given population group is extremely important for the assessment of overall and relative cardiovascular risk, as well as of the probability of developing atherosclerotic diseases in comparison

with other professional categories (2,3,4).

Due to the specificity of the profession, it is expected that the active military personnel should present certain particular features regarding cardiovascular risk factors. The aim of this study is to identify these particular features and assess their impact on atherosclerotic cardiovascular diseases.

MATERIAL AND METHOD

The study included 920 subjects, employed by military units of Cluj-Napoca, belonging to land forces of all specialties, as well as to the air force, namely military airplane pilots, helicopter pilots, parachute corps, and ground personnel specialized in flight control.

Of the 920 subjects, 868 (94.3%) were men, aged between 21 and 55 years, all active professionally (active military personnel or with current working contracts).

The study included 52 women, active military or civil servants having similar occupations (administration, health care, logistics), taking into account that women are not many in the army forces in the strict sense.

Of the 52 women, 17 (32.69%) were military personnel and 35 (67.31%) were civil servants employed by the military forces and whose activity did not differ from the military personnel.

It is important to emphasize that of the 920 subjects studied, the majority participated in the NATO missions, mainly Afghanistan and Iraq, but also other regions; the minimum

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duration of the missions was 6 months.

Thus 740 subjects (80.43%) participated in international missions, and 180 (19.57%) remained to work in their units. Only 3 women (0.40%) participated in international missions.

All the subjects underwent a general clinical examination; body weight, BMI, blood pressure, total cholesterol, triglycerides and sugar levels were also taken.

All the subjects filled in a questionnaire aiming at discovering life style and behavioral risk factors for cardiovascular disease. The questions referred to smoking habits (number of cigarettes a day), alcohol and coffee consumption, diet (fats, salt and sugar intake), physical activity (not work-related), mental stress, quality and duration of sleep.

Family history of cardiovascular diseases, as well as metabolic disturbances – lipid or glucose regulation - were also recorded.

For mental stress we used our own questionnaire, adapted from several existing ones, based on 2 issues: quality of sleep and self- assessment of anxiety and/or depression and using a 3 levels: 0 – no stress; 1 – mild to moderate stress; 2 – high level of stress.

The study was carried out for 2 years, between November 2003 and November 2005.

RESULTS

The characteristic features of the study group are presented in Figure 1, while the main results are shown in Table 1.

Figure no. 1. Age distribution in the study group

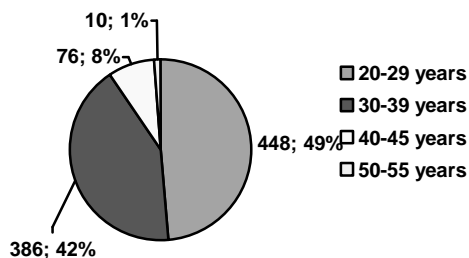


Table no. 1. Prevalence of cardiovascular risk factors in the study group

Cardiovascular risk factors	Whole group	Male	Female
Arterial hypertension	20,76%	20,39%	26,92%
Upper normal limit of blood pressure	28,26%	28,92%	17,31%
High cholesterol level	58,48%	59,56%	40,38%
High triglycerides	42,28%	43,78%	17,31%
Smoking	61,2%	61,8%	50,1%
Abnormal glucose metabolism	12,93%	13,36%	5,77%
Diabetes mellitus	2,39%	2,3%	3,85%
Impared fasting glucose	10,54%	11,06%	1,92%
Overweight and obesity	52,60%	52,76%	50%
Overweight	45,43%	46,65%	25%
Obesity	7,17%	6,10%	25%
Stress	89,66%	90,55%	75%
Sedentary life style	37,5%	35,48%	71,15%

Arterial hypertension was present in 20.76% of the subjects (20.39% of men and 26.92% of the women). A significant proportion of the active military population had upper limit blood pressure – 28.26% (28.92% of men, and

17.31% of women).

Hypercholesterolemia was 58.48% (59.56% men and 40.38% women). **Triglycerides** were high in 42.28% (43.78% men, 17.31% women).

Smoking was extremely frequent, found in 61.2% of men (61.8% men, 50.1% women), almost double as compared to the general population.

Glucose metabolism disturbances, i.e. **diabetes mellitus** or **impaired fasting glucose** were found in 12.93% of the subjects. However, diabetes mellitus was found only in 2.39%.

Overweight and obesity were surprisingly frequent in the active military population, together representing 52.60%. Overweight was found in 45.43%, while obesity only in 7.17% of the cases.

Stress – considered specific of military activities, was self-reported by 89.66% of the subjects, 90.55% of men and 75% of women.

Sedentary life style was surprisingly frequent in the category, being self-reported by 37.5% of the subjects (34.48% men and 71.15% women).

DISCUSSION

The evaluation of risk factors in the active military population represents a clinical and epidemiological action justified by the fact that this population category has not been sufficiently investigated, though exposed to a number of particular risk factors and behaviours. This may be explained by the fact that from the start this category is considered healthy, ignoring the fact that it is submitted to activities involving high physical and mental stress, as well as a certain deprivation, all representing real cardiovascular risk factors.

These risk factors occur earlier than in the general population and are correlated with the high professional stress, specific of this profession (5).

Arterial hypertension had a high prevalence in ours study (20.76%) and occurred at younger ages. The overall prevalence of hypertension in our country is 40% (1), but at much older ages than our group. Bordeline blood pressure was also significantly increased (21.3%) as compared to the general population. Hypertension is also frequent among the military personnel of other countries too. Thus, in a group of young Hungarian pilots, hypertension was found in 14.7% in 2007 (6), explained by salt intake, smoking and stress. In Israel, a study of 2006 evidenced pre-hypertension in 50.6% of young men and in 35.9% of women, the precipitating causes being increased BMI, dyslipidemia and life style (7). Values similar to our study were found in French soldiers (21.7%) by the EPIMIL study published in 2007 (8), while in Greece (2005), the estimated hypertension prevalence is 78% of the 23.6% military personnel presenting a metabolic syndrome (9).

High cholesterol levels were found much more frequently than in the general Romanian population, which is 24% (1). Cholesterol levels were already high at young ages (decades 2 and 3) and increasing significantly (p < 0.01) with each decade. In a study carried out in young American marines, hypercholesterolemia varied between 11.3 % and 34.6% (10). A study of young (17-35 years) USA soldiers evidenced 32% of them with CT ≥ 200 mg%, to which obesity and smoking were added (11).

The AFCAPS study demonstrated in 2000 in a group of military personnel that lovastatin therapy correlated with a change in life style determined a 37% decrease of the incidence of the first major coronary event in subjects with elevated mean cholesterol (12); this is also supported by Clearfield *et al.* in a group of military pilots (13). High cholesterol levels (53.9%)

were found by Grosz C. in young Hungarian soldiers (6).

Triglycerides were high in 42.28% of our group, clearly higher than in the general population (23% according to the SEPHAR study) (1). A recent study performed in military pilots of Saudi Arabia in 2007 evidenced that 100% of the subjects with metabolic syndrome had serum TG \geq 150 mg/dl (14). In another study performed in 2005 by Al-Qahtani *et al.* in Saudi military aged 20 – 60 years, triglycerides were high in 32.2% (15).

Smoking was found extremely frequent in the active military population, reaching 61.2%, much higher than the average in the general population (29% according to the SEPHAR study) (1). The prevalence is higher than the one reported by Patton JF *et al.* in young American pilots (36%) (11). Another study performed in Great Britain in 1981 found a significantly high prevalence of ischemic heart disease in the military personnel as compared to the civil population; the phenomenon was explained by the high smoking rate among the military (16).

Overweight and obesity had an overall prevalence of 52.60%, similar to the general population (1), but still high considering the specific group. Unlike in the general population though, overweight was predominant (45.43%), obesity as such being rare (7%).

Data in literature regarding overweight and obesity in the military population and armies show a surprisingly high prevalence. Thus, in a young military population, aged between 17 – 35 years, in the USA in 1980, obesity was found in 29% (11). A study carried out in Singapore military population by Gan SK *et al.* (2003) evidenced a close correlation between hypertension and obesity (17).

In another study performed in the USA (2005) in a group of retired army personnel and their families, age range 38-64 years, overweight and obesity together was 33% in men and 29% in women (18).

Abnormal glucose metabolism had a prevalence of 12.93%, similar to the general population, but diabetes mellitus was much lower (2.39%) than in the general population – 5% according to the SEPHAR study, while impaired glucose tolerance was 13% (1).

Chen CH *et al.* have evidenced a prevalence of diabetes mellitus of 6.7% in a group of military and civil personnel (19). Another study performed by Jiang BQ *et al.* (2007) in a sample of urban Chinese population (military and civil), young and adults, evidenced a 11.2% prevalence of diabetes mellitus (20).

Sedentary life style found in over one third of our group was high and it could contribute to the increase of cardiovascular risk.

A study performed in a group of Pakistani military personnel by Gandapur AS *et al.* in 2006 evidenced the fact that constant aerobic exercise improved the lipid profile (decrease of B apoprotein, LDL cholesterol and the CT/HDL ration), as compared to subjects who were sedentary (21).

The prevalence of stress in the studied group reached 89.67%, which makes it a major factor of cardiovascular risk, specific for the active military population. The study of Chen CH *et al.* (1995) on a population of the Kin-Chen, Kinmen province of Taiwan, 40 years under foreign military control, evidences a wide range of cardiovascular risk factors and cardiovascular pathology. The prevalence of Arterial Hypertension (\geq 160/95 mmHg) was 25.2% in men, smoking was found in 41.5% of men, while possible ischemic heart disease was 21.4% in women and 17.6% in men (19).

A report published in 1993 by Nanda A on the health state of military and civil population in the European countries

confirmed that cardiovascular disease represented the main cause of mortality, and especially due to stress (22). Nisara S. *et al.* (2009) have shown that in a group of American soldiers there was a direct link between stress (fighting forces) and hypertension. It was found that in fighting forces, after 3 years of follow-up, there were 6.9% more cases of hypertension than in non-fighting forces. A great majority were involved in Iraq and Afghanistan. In the active soldiers the probability to develop hypertension was 1.33 greater, stress being the sole risk factor for the appearance of new cases (23). In August 2009 Mullie P *et al.* showed in a group of 5000 military, Belgian men, that healthy eating habits depended on cultural, socio-economic and nutritional (traditional) factors. Thus, margarine, rich in phytosterols or phytostanol was used daily by 26.3% of the group, 10.2% took a glass of red wine per day, 19.1% had several portions of fruit, and 26.6% had more vegetables. Only 12.3% consume fish once a week. Fermented dairy products increased with physical activity and intake of vitamin supplements (24).

CONCLUSIONS

1. Major cardiovascular risk factors (hypertension dyslipidemia, smoking) had a higher prevalence in the active military population than in the general population and occurred at younger ages.
2. The prevalence of smoking was double as compared to the general population, and so did hypercholesterolemia and hypertriglyceridemia.
3. Overweight and obesity were surprisingly high for this group, even if it did not differ much from the general population. It was the same for glucose disturbances
4. Sedentary life style was also surprisingly high in the military population.
5. Stress was highly prevalent in the active military population, representing a true risk factor, specific for this population group.

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