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Prevalence of Hypertension in Lithuanian Mariners

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ABSTRACT

Several international studies from Spain, the Netherlands, Poland, Croatia, and Finland indicate contradicting findings regarding cardiovascular dysfunction among seamen, deep sea fishermen, and harbor workers [1,2]. The purpose of the present survey was to evaluate the prevalence of hypertension in a selected group of Lithuanian seamen.

The survey was conducted during a one year period and involved sailors from commercial, passenger, and fishing boats. The survey took into account the sailors' marital status, education, professional rank and duty, and length of stay at sea. It also included demographical data, complete family health history, the sailor's awareness about their health in general, and awareness about their blood pressure in particular. Their dietary habits, changes in body weight, the history of alcohol intake and tobacco usage were also recorded.

Analysis of our data indicates that 44.9% of Lithuanian mariners suffer from a clinically significant elevation of blood pressure, as compared to 53% of the general population of Lithuania. Some of the leading risk factors are: a high cholesterol diet and increased body mass index (BMI), smoking, alcohol abuse, family situation and level of education. The high prevalence of the cardiovascular risk factors was to be found related to ischemic heart disease and cerebrovascular illness. This may be influenced by poor eating habits, poor health awareness and other social and environmental factors which are common to seamen.

Increased blood pressure is a widespread condition that affects a large portion of the population in developed countries [3]. It is an important risk factor for cardiovascular and cerebrovascular disease, as well as a significant preventable cause of mortality. According to the World Health Organization (WHO), hypertension is a risk factor for cardiovascular disease, which accounts for an estimated 17 million deaths each year [4]. With hypertension, the risk of stroke increases 2.6-3.8 times, the risk of ischemic heart disease (IHD) – 2.0-2.2 times, and that of congestive heart failure (CHF) – 3.0-4.0 times [5]. Hypertension is often accompanied by other cardiovascular risk factors such as dyslipidemia, smoking, diabetes and increased body mass index (BMI). When hypertension is present in conjunction with other risk factors, the risk of mortality associated with IHD can increase tenfold [6]. On the other hand, risk factors such as an increased BMI, smoking, alcohol abuse, lack of exercise and a diet high in salt and fatty foods can themselves play an instrumental role in the etiology of hypertension [7,8].

Several studies have been performed on the prevalence of hypertension among the general population in Lithuania, which is higher than that of most other European countries. Reviews performed by the programs CINDI (Countrywide Integrated Noncommunicable Disease Intervention) [9,10,11] and MONICA (MONItoring CArdiovascular Disease) [12,13] determined that about half of all studied persons of middle age in Lithuania were hypertensive. Our work is the first study seeking to examine the prevalence of hypertension among Lithuanian seamen, as well as its association with various risk factors and dependence on demographic indices.

METHODS

Because of the rigorous demands of the profession, all seamen are required to undergo an annual physical exam. Blood pressure is measured during this exam. Approximately 6,000 to 7,000 Lithuanian seamen have a physical exam performed each year. Of these, 1135 sailors were randomly selected to participate in this study. Only 119 (10.48%) of the seamen were under treatment for hypertension. Women made up a small minority of the sailors (<1%), thus they were not included in the study. The study was conducted between March and August of 2003. The seamen's blood pressure was recorded and interpreted according to the regulations approved in 2003 by the European Society of Cardiology and the European Society of Hypertension [14,15].

Hypertension was diagnosed when the systolic blood pressure was greater than 140 mmHg, and/or the diastolic greater than 90 mmHg. Hypertension was further classified into stages I, II, III and isolated systolic according to the directives published by the WHO in 2003 [14]. Stage I: 140-159/90-99mmHg, stage II: 160-179/100-109 mmHg,

stage III: ≥180/110 mmHg, and isolated systolic hypertension: ≥140/<90 mmHg.

The seamen were differentiated according to demographic characteristics and risk factors. Their age, length of time spent at sea and overall duration of service were taken into consideration, as well as their BMI, and use of tobacco and/or alcohol. The seamen were divided into four age groups: 19-29 years, 30-39 years, 40-49 years, and 50-69 years of age. They were divided into three groups according to the length of time spent at sea, measured in months over the duration of one year: 1-3 months/year, 4-6 mo/yr, and 7-12 mo/yr. The sailors were also divided into four groups according to overall duration of service in years: <1 year, 1-9 yrs, 10-19 yrs, and ≥20 yrs. Furthermore, they were divided into four groups according to BMI: normal (18.5-24.9kg/m^2), overweight (25.0-29.9kg/m^2), obese (30.0-39.9 kg/m^2), morbidly obese (≥40kg/m^2).

The prevalence of hypertension was standardized according to age based on the European structure of the population ages 20-69 [16]. Statistical data analyses were performed using the following programs: “Statistika”, “SPSS”, and “MS Excel”. Normal distribution of studied variables was used with an alpha level of statistical significance of 0, 05. The difference between the independent variables was calculated using Students criteria, T-test was used to evaluate if two groups are significantly different according to their means. A pared Students criterion was applied on interdependent parameters. In order to determine whether the differences between the observed and expected scores can be attributed to some actual difference in behavior or if this difference between the scores is caused by chance Chi-square method was applied. Differential analyses of the interval or ratio values also included Spearman's rank correlation. Pearson's correlation coefficient was used to asses the degree and direction of the linear relationship between two variables.

RESULTS

Analysis of the data from 1135 male seamen (Table I) showed that their average age was 42.0 ± 10.8 years, their average height was 177.3 ± 6.5 cm, their average weight was 84.3 ± 12.7 kg, and their average systolic and diastolic blood pressures were 136.6 ± 14.7 and 85.6±7.8 mmHg, respectively. It was found that 535 (47.2%) seamen had a blood pressure greater than or equal to 140/90 mmHg. When standardized for age according to the European structure of the population ages 20-69 [16], the percentage of hypertension in the group studied was 44.9%. Both systolic and diastolic blood pressures were normal in 55.1%. The prevalence of the different stages of hypertension is presented in Table II.

The distribution of hypertension according to the seamen’s demographic characteristics is shown in Table III. The increase in prevalence of hypertension with increasing age was statistically significant, as was the increase in prevalence of hypertension with increasing amount of years spent in the service ($p<0.05$). Interestingly, an increased prevalence of hypertension was noted with a shorter duration of time spent at sea during a single trip. Although the overall relationship between hypertension and the number of months spent at sea was not statistically significant, there was a statistically significant difference ($p=0.02$) when comparing hypertension in seamen who spent 1-3 months at sea (59.2%), and in those who had spent 4-6 months at sea (44.6%).

The distribution of hypertension according to risk factors (smoking, alcohol use, and increased BMI) is presented in Table IV. More than half of the seamen in our study were smokers. Although the percentage of sailors with hypertension was similar in both the smoking and non-smoking groups, there was a statistically significant increase in hypertension noted with increasing number of cigarettes smoked per day and total years smoked. Of the seamen that smoked, 54.7% were light smokers (< 10 cigarettes/day), 36.8% were moderate smokers (10-20/day), and 8.5% were heavy smokers (>20/day). There was a statistically significant increase in the prevalence of hypertension as the number of cigarettes smoked per day increased: light smokers had 42.0%

Table I. Statistical analysis of the age, height, weight, BMI, systolic and diastolic blood pressures of the seamen studied (n=1135).

Parameter	Average ±SD	CI – 95.0%	CI + 95.0%	Minimal value	Maximal value
Age (years)	42.0±10.8	42.1	43.3	19.0	69.0
Height (cm)	177.3±6.6	176.9	177.7	150.0	198.0
Weight (kg)	84.3±12.7	83.5	85.0	50.0	176.0
BMI (kg/m^2)	26.8±3.7	26.6	27.0	18.5	57.5
Systolic BP (mmHg)	136.6±14.7	135.7	137.4	100.0	190.0
Diastolic BP (mmHg)	85.6±7.8	85.2	86.1	70.0	110.0

Table II. Levels of hypertension (HTN) when standardized for age.

Blood pressure	Percentage
Normal (≤140/≤90mmHg)	55.1%
Stage I HTN (140-159/90-99 mmHg)	30.1%
Stage II HTN (160-179/100-109 mmHg)	10.9%
Stage III HTN (≥180/110 mmHg)	0.9%
Isolated systolic HTN (≥140/<90 mmHg)	3.0%

hypertension, moderate – 49.8%, and heavy – 64.2% (p=0.003 when comparing light and heavy smokers).

Evaluation of the number of years the men had been smoking showed that 52.6% had smoked many years (>15 yrs.), 27.5% – an intermediate number of years (5-15 yrs.), and 19.8% – a few years (<5 yrs.). There was a statistically significant correlation between the prevalence of hypertension and the number of years smoked. Of those that had been smoking a few years, 31.8% had hypertension, while 44.7% of those smoking an intermediate number and 50.9% smoking many years had hypertension (p=0.0003 when comparing those smoking <5 yrs. with >15 yrs.).

A very large percentage (82.5%) of the seamen we studied indicated that they do consume alcohol, and the majority of these (40.1%) reported doing so once a week. The difference in the prevalence of hypertension among seamen who did not drink alcohol and those that drank alcohol once a day or once a week was found to be statistically significant (p<0.05).

A direct correlation was noted between increasing BMI and an increased prevalence of hypertension. Hypertension was most prevalent among obese and overweight seamen: 72.9% and 50.6%, respectively. Conversely, only 28.6% of the seamen with a normal BMI had hypertension. When data from the groups with an increased BMI was compared with that of the group with a normal BMI, the difference was found to be statistically significant (p<0.05).

DISCUSSION

The overall prevalence of hypertension in the general population of Lithuania is higher than the average prevalence in other Western European countries: 53% as compared to 44.2% [9,17]. This discrepancy can be attributed to many factors, including differences in lifestyle (diet, exercise habits, levels of stress), as well as in the prevalence of various risk factors (e.g. smoking, alcohol consumption, etc.).

Mariners as a subgroup of the general population have been the focus of numerous studies conducted in different countries worldwide [18-20,2]. They have been identified as a high-risk group. Our study showed that the prevalence of hypertension among Lithuanian seamen was similar to, but still less than, that of the Lithuanian population as a whole: 44.9% (when standardized for age; otherwise: 47.2%) as compared to 53%.

It is important to note that the general population encompasses both healthy individuals, as well as those with cardiovascular and other chronic conditions. The seamen, on the other hand, are

Table III. Distribution of hypertension according to demographic characteristics.

	Demographic Characteristics										
	Age (in years)				Length of time spent at sea (in months) per trip per year			Duration of Service (in total years)			
	19-29	30-39	40-49	50-69	1-3	4-6	7-12	<1	1-9	10-19	≥20
Number	180	211	411	333	76	576	483	63	269	313	490
% of total seamen	15.9	18.6	36.2	29.3	6.7	50.7	42.6	5.5	23.7	27.6	43.2
Number with hypertension	25	77	215	218	45	257	233	14	74	144	303
% of subgroup	13.8	36.5	52.3	65.4	59.2	44.6	48.2	22.3	27.5	46.1	61.8

Table IV. Distribution of hypertension according to risk factors.

	Risk Factors					
	Smoking		Alcohol Use		Weight	
	Non-smoker	Smoker	No alcohol use	Alcohol use	Normal BMI	BMI ≥25.0
Number	508	627	198	937	380	755
% of total seamen	44.8	55.2	17.5	82.5	33.5	66.5
Number with hypertension	248	263	32	453	109	426
% of subgroup	48.8	41.9	15.9	48.3	28.7	56.4

considered to be a healthy group. A mariner's job is very physically demanding. Only those who are physically fit and healthy apply for such a job, and they are medically screened before being accepted. One would thus expect the prevalence of hypertension among this population of healthy, working individuals to be significantly lower than that of the general population.

One explanation for a greater prevalence of hypertension than expected among these seamen is that they do appear to have a higher percentage of risk factors for high blood pressure than men in the country's general population: 60% of Lithuanian men ages 25-64 were overweight or obese [21], compared to 66.5% of the seamen studied. Also, 43.7% of Lithuanian men smoke [12], compared to 55.2% of Lithuanian seamen.

There are a number of reasons that the seamen might have more risk factors. Their job is very stressful, they are separated from their families for months at a time, and they are unable to rest from their work for extended periods of time. This might lead to an increase in smoking and alcohol intake. As was expected, more cases of hypertension were noted among those that smoked more and for longer periods of time, as well as among those that used alcohol in larger amounts. The very nature of their work puts these men into a separate category of the population. When at sea they all eat a standardized diet that is high in fat and dominated by meat products and starch (potatoes), and contains few vegetables or fruits. The cuisine is probably based on both the general eating habits indigenous to Lithuania, as well as on financial constraints limiting the availability of healthier alternatives. There are also fewer opportunities for ambulation and exercise while at sea, especially for aerobic exercise. In addition, there seems to be little education or interest in a healthy lifestyle among seamen.

As the physical demands and health requirements are rigorous and the job market competitive, most seamen appear to be reluctant to seek medical help even when they are not feeling well. A lack of timely medical care may also contribute to a fairly high prevalence of incidental hypertension among the mariners. It is important to note the working conditions of the sailors – while at sea, they are subjected to different environmental conditions than those working on land. Factors such as unstable ground, seasickness, a hostile and quickly changing environment, vibration, etc. may have an impact on the mariner's health in general and cardiovascular system in particular.

A significantly increased prevalence of hypertension correlated with both time of service and duration of time spent at sea during a single trip. More cases of hypertension with increasing duration of service might be explained by the fact that the older men were the ones who had worked as sailors longer. Also, their cardiovascular and autonomic nervous system compensatory mechanisms may no longer be as efficient due to the many years of working as a mariner.

Interestingly, the men making shorter trips (1-3 months/trip/year) had a statistically significant higher prevalence of hypertension than those taking longer trips. It might be speculated that a trip to sea of longer duration allows more time for the body's adaptive mechanisms to be engaged.

It is important to recognize that mariners as a group live and work under conditions that are unique to them. They seem to have an increased amount of risk factors leading to increased cardiovascular morbidity and mortality. The prevalence of hypertension among them, although still less than that in the general population of Lithuania, was consequently higher than would be expected. While

some of the factors influencing the blood pressure and general health of these sailors cannot be controlled, alteration of those factors that can be changed would have a great positive impact on the health of this population.

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