

Prevalence of arterial hypertension in Vietnamese seafarers aboard merchant vessels: a cross-sectional study

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ABSTRACT

Background: Hypertension is one of the leading causes of morbidity and mortality globally. It is a major risk factor for major cardiovascular events such as stroke, myocardial infarction, heart failure, kidney failure, and blindness. The aim of this research is to assess the prevalence and some factors related to arterial hypertension on Vietnamese seafarers aboard merchant vessels.

Materials and methods: Seven hundred eight Vietnamese seafarers working aboard merchant ships were examined at the Institute of Marine Medicine before going to sea during the period from January 2022 to December 2022. It was a cross-sectional descriptive epidemiological study. The following parameters were measured: blood pressure, height, weight, waist circumference, buttock circumference to assess the prevalence of hypertension, overweight, and obesity. Seafarers were directly interviewed about workplace on ships and physical exercise, smoking tobacco, alcohol abuse, and anxiety symptoms to identify several factors associated with hypertension.

Results: The prevalence of hypertension in seafarers was 32.9%, prehypertension 26.4%, overweight 32.4%, obesity 13.3%, abdominal obesity 47.7%. Factors related to hypertension of seafarers included: job duration at sea > 10 years, odds ratio (OR) = 8.23 (95% confidence interval [CI] 4.34–17.27); non-officers, OR = 2.11 (95% CI 1.45–2.82); engine room crew, OR = 2.11 (95% CI 1.45–3.58); obesity, OR = 3.34 (95% CI 2.15–5.63); abdominal obesity, OR = 9.12 (95% CI 4.23–18.45); current smoking, OR = 1.32 (95% CI 1.02–1.99); irregular exercise, OR = 1.43 (95% CI 1.03–2.18); anxiety symptoms, OR = 1.56 (95% CI 1.08–2.27).

Conclusions: Hypertension is a health problem for Vietnamese seafarers. To minimise hypertension, seafarers need to adjust their lifestyle, increase regular exercise and improve psychological issues on board.

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Keywords: hypertension, seafarers, related factors, Vietnam

INTRODUCTION

Hypertension is one of the leading causes of morbidity and mortality globally. According to the statistics

of the World Health Organization (WHO), in 2000, there were about 972 million people with hypertension in the world and 7.5 million people died from hypertension. It is estimat-

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ed that about 1.56 million people will have hypertension globally by 2025 [1, 2]. Hypertension is a major risk factor for serious cardiovascular events such as stroke, myocardial infarction, heart failure, renal failure, and blindness [1–3].

In Vietnam, the prevalence of hypertension tends to increase among adults. According to statistics, in 1960, the prevalence of hypertension in adults in the north of Vietnam was only 1% and more than 30 years later (1992) according to a nationwide survey of the Institute of Cardiology, this prevalence was 11.2% – increased more than 11 times [3]. According to the 2008 survey results, the prevalence of hypertension in people aged 25–64 is 25.1% [4]. According to the National Census on Risk Factors for Non communicable Diseases in Vietnam 2015, 18.9% of adults aged 18–69 years had hypertension, of which 23.1% were men and 14.9% women. Thus, 1 in 5 adults aged 25–64 years had hypertension [5].

Seafaring is a particularly strenuous and hazardous profession. When sailing at sea, the ship is both a living place and a working place for the seafarers. Working conditions at sea are extremely difficult, and the seafarers often have to work in harsh conditions of nature: big waves, high winds and working conditions are not up to the allowable standards such as: vibration, noise, high temperature, wet, slippery [6–9]. In addition, the duration of each seafarer's journey at sea is 9–12 months, or even longer. During the time of working at sea, workers have to suffer loneliness, isolation from the mainland, live and work in an abnormal micro-social environment such as the same-sex society. As a result, a psychophysical stress is created, which is favourable conditions for the increase of occupational diseases, including hypertension [6–8]. Pougnet et al. [10] studied 57,473 European sailors and 327 sailors from other continents through an analysis of 18 articles from the journals 'Medline and Medicine Maritime'. The results showed that the smoking rate of seafarer was 61.4%, overweight and obesity 60.9%, hypertension 30.1%, hypercholesterolaemia 34.6%, and diabetes 3.3–9.3%.

Tu and Jepsen [6] studied 629 Danish seafarers and found that the seafarer's prevalence of hypertension was 44.7%. Hypertension is strongly associated with alcohol abuse, smoking, overweight and obesity [6]. The prevalence of hypertension in seafarers according to the results of studies is higher than in adults on land [5, 11, 12]. The question arises, what is the prevalence of hypertension in Vietnamese seafarers and what factors affect seafarers' hypertension. To answer the above question, we conducted a research on the topic with the following objectives: Assess the prevalence and some factors related to arterial hypertension in Vietnamese seafarers aboard merchant vessels in 2022.

MATERIALS AND METHODS

MATERIALS

Seven hundred eight Vietnamese seafarers with ≥ 2 years of working experience, working onboard merchant ship, were given health checks at the Institute of Marine Medicine before going to sea during the period from January 2022 to December 2022. Research subjects were divided into three groups: deck group; engine room group; seafarers doing other positions (electrical group, service group...).

METHODS

It was a cross-sectional descriptive epidemiological study. A list of seafarers was made and they had health check-ups and management at the Institute of Marine Medicine. Systematic random sampling method was applied in this study and we collected 708 seafarers.

The method of data collection: Seafarers were examined by specialised doctors of the Institute of Marine Medicine who measured blood pressure, height, weight, waist circumference, buttock circumference. Seafarers were required to rest 30 minutes, not use stimulants such as coffee or tobacco before blood pressure measurement. We interviewed directly seafarers about workplace group on the ship, physical exercise, smoking, alcohol abuse, and anxiety symptoms to identify several factors associated with hypertension.

Assessment of hypertension according to the criteria of the International Society of Hypertension 2020 (ISH 2020) [13]. Hypertension was defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg or being treated with antihypertensive drugs. Prehypertension is when systolic blood pressure is 130–139 mmHg and/or diastolic blood pressure is 85–89 mmHg [13].

Assessment of overweight and obesity was based on body mass index (BMI), which is calculated by the formula: weight [kg]/height [m²]. According to WHO standards for adults in Asia [14]: underweight is defined as BMI < 18.5 kg/m², normal weight BMI 18.50–22.9 kg/m², overweight BMI 23.00–24.9 kg/m², and obesity BMI ≥ 25 kg/m² [14].

Assessment of abdominal obesity based on waist/hip ratio (WHR): According to WHO report applying to the Asia-Pacific region: abdominal obesity is defined as a WHR ≥ 0.90 for males and ≥ 0.80 for females [15].

Assessment of anxiety, depression, and stress of seafarers based on the Depression-Anxiety-Stress Scale-21 (DASS 21). DASS-21 consists of 21 questions on 3 issues related to psychological health: depression (7 questions), anxiety (7 questions), and stress (7 questions). Each symptom question corresponds to a psychological health condition within a past week on a scale of 0 to 3 for each response: Did not apply to me at all, applied to me to some degree or some of the time, applied to me to a considerable degree or a good part of time and applied to me very much or most

of the time. There are symptoms of anxiety when the score is ≥ 8 [16].

Abuse of alcohol: Interviewing seafarers about drinking alcohol in the past 7 days. Alcohol abuse is determined according to the standards of the WHO: drinking more than 3 units of alcohol/day or 21 units of alcohol/week for men and more than 2 units of alcohol/day or 14 units of alcohol/week for women. One unit of alcohol is equivalent to 10 grams of pure alcohol contained in drinking solution = 0.1 standard cup. One standard cup is equivalent to 1 can of 330 mL beer with 5% concentration, 1 cup of 125 mL wine with 11% concentration, 0.1 glass of 75 mL strong wine with 20% concentration, 1 cup of 30 mL spirit of 30% concentration [17].

Interviewing the seafarers' exercise status on the ship such as (walking, playing tennis, gym) for more than 1 week. **Regular exercise:** at least 30 minutes/day and for ≥ 5 days/week [18]. **Smoking habit:** A non-smoker is someone who has never smoked any tobacco. Having a habit of smoking is a person who currently smokes at least one cigarette a day.

STATISTICAL ANALYSIS

The research data were processed by biomedical statistical methods based on SPSS for Window 20 software. Frequency and percent distributions were used to describe qualitative variables. The χ^2 test was used to compare two ratios. Mean values were used to describe quantitative variables. Mean values were compared using the t-test. The adjusted odds ratio (OR) and 95% confidence interval (CI) were used to determine the association between risk factors for seafarer hypertension. Risk factors were identified through multivariable logistic regression analysis.

INFORMED CONSENT

This study was approved by the Ethics Committee in Biomedical Research of the Institute of Marine Medicine according to decision 05/2022/QD-YHB. All seafarers signed informed consent before the medical examination.

RESULTS

The study included 708 seafarers. Clinical examination included: measuring blood pressure, height, weight, WHR and directly interviewing some factors related to hypertension. We obtained the following results.

Characteristics of seafarers' age, job duration at sea, educational level and workplace. The examined group included 708 Vietnamese seafarers aged 22–59 years old (Table 1). The average age of seafarers participating in the study was 35.5 ± 7.3 ; age distribution was as follows: 20–29 (23.0%), 30–39 (43.2%), 40–49 (30.6%), ≥ 50 (3.2%).

Table 1. Characteristics of seafarers' age, job duration at sea, educational level and workplace group (n = 708)

Variable	
Age [years]	35.5 ± 7.3 (22–59)
Age group [years]:	
20–29	163 (23.0%)
30–39	306 (43.2%)
40–49	217 (30.6%)
≥ 50	22 (3.2%)
Job duration at sea [year]:	11.6 ± 6.9 (2–32)
2–5	168 (23.7%)
6–10	176 (24.9%)
11–15	137 (19.4%)
16–20	121 (17.0%)
> 20	106 (15.0%)
Education level:	
Intermediate	367 (51.8%)
University/College	341 (48.2%)
Workplace:	
Deck crew	350 (49.4%)
Engine room crew	220 (31.1%)
Other crew	138 (19.5%)

Data are shown as mean (standard deviation), (minimum–maximum) or number (percentage).

The average of job duration at sea was 11.6 ± 6.9 years; job duration at sea ≤ 10 years (48.6%), job duration at sea > 10 years (51.4%). The seafarers of the deck group accounted for the majority (49.4%), the engine room group (31.1%), other crews (19.5%).

Body mass index, WHR of seafarers. Assessment and classification of nutritional status (BMI) and WHR of seafarers according to the standards of the WHO for Asians showed that the prevalence of seafarers with overweight was 32.4% and obesity 13.3%. The prevalence of seafarers with WHR ≥ 0.90 was 47.7% (Table 2).

Prevalence of hypertension and grade of hypertension of seafarers. The prevalence of artery hypertension of seafarers was 32.9%, of which, grade I hypertension accounted for 25.1%, grade II hypertension for 7.8%, there were no seafarer with grade III hypertension. The prevalence of seafarers with prehypertension was 26.4% (Table 3).

Multivariate analysis of factors related to seafarers' hypertension. Multivariate analysis of factors related to seafarers' hypertension (Table 4) showed that: seafarers with > 10 years of job duration at sea were 8.23 times

Table 2. Body mass index (BMI), waist/hip ratio (WHR) of seafarers (n = 708)

Variable	
BMI:	27.7 ± 2.3
Underweight	30 (4.2%)
Normal weight	355 (50.1%)
Overweight	229 (32.4%)
Obesity	94 (13.3%)
Waist circumference [cm]	87.1 ± 7.1
Hip circumference [cm]	91.7 ± 7.8
WHR:	0.95 ± 0.08
≥ 0.90	338 (47.7%)
< 0.90	370 (52.3%)

Data are shown as mean (standard deviation), (minimum–maximum) or number (percentage).

Table 3. Prevalence of hypertension and grade of hypertension of seafarers (n = 708)

Variable	Number (%)
Arterial hypertension:	
Yes	233 (32.9%)
No	475 (67.1%)
Grade of hypertension:	
Normal	288 (40.7%)
Pre hypertension	187 (26.4%)
Grade I hypertension	178 (25.1%)
Grade II hypertension	55 (7.8%)
Grade III hypertension	0 (0.0%)

more likely to have hypertension than seafarers with ≤ 10 years of job duration at sea (95% CI 4.34–17.27, $p < 0.001$). Non-officer had a 2.11 times higher risk of developing hypertension compared with the group of officer (95% CI 1.45–2.82, $p < 0.001$). Seafarers in the engine room group had a 2.11 times higher risk of hypertension than seafarers in other groups (electrical, service). Seafarers with WHR ≥ 0.90 were 9.12 times more likely to have hypertension than seafarers with WHR ≤ 0.90 (95% CI 4.23–18.45, $p < 0.001$). Seafarers with BMI > 25 had a 3.34 times higher risk of hypertension than seafarers with BMI < 23 (95% CI 2.15–5.63) (Table 4). Smoking and alcohol abuse increased the risk of hypertension by 1.32 and 2.1 times, respectively ($p < 0.05$). Seafarers with irregular exercise were 1.43 times more likely to have hypertension (95% CI 1.03–2.18, $p = 0.035$). Anxiety increased

the risk of hypertension by 1.56 times on seafarers with 95% CI 1.08–2.27 ($p = 0.019$) (Table 4). There was no relationship between educational level and the prevalence of hypertension of seafarers ($p > 0.05$).

DISCUSSION

Assessing the nutritional status of Vietnamese seafarers according to the standards of the WHO for Asians, the results of the study (Table 2) showed that the average BMI was $22.7 \pm 2.3 \text{ kg/m}^2$; the prevalence of overweight and obese seafarers was 45.7%, of which overweight were 229/708 (32.4%) and obese were 94/708 (13.3%). The results of our study are higher than that of some authors on adults in Vietnam. Do et al. [12] surveyed 17,199 Vietnamese subjects aged 25–64, with a mean BMI of 20.7 kg/m^2 . Binh et al. [19] studied 2,443 people in the Red River Delta of Vietnam and found that the central obesity prevalence was 12.3%. Vu et al. [20] studied Vietnamese people aged 25–64, showing that the prevalence of overweight and obesity was 20.57%. In a study by Quoc Cuong et al. [21] in Ho Chi Minh City, Vietnam, aged 18–69, the prevalence of overweight and obesity was 20.2%.

The prevalence of overweight and obesity in our study (Table 2) is corresponding to the authors' study on crew members in different countries [7]. Pougnet et al. [10] analysed 8 articles with 57,473 European sailors and 327 sailors from other continents and found that the rate of overweight and obesity was from 27.9% to 66.5%. The obesity rate according to Ayelo's study [22] on German crew members was 21.5%. Nittari et al. [7] studied 1,155 seafarers flying the Italian flag from 2013 to 2016 and found that 40.8% of seafarers were overweight and 11.2% of seafarers were obese. Nas et al. [23] studied Turkish crew members and showed that overweight and obesity tend to increase; the average BMI was 27.8 kg/m^2 , the prevalence of overweight and obesity was 52.1%. Hansen et al. [24] studied 2,101 Danish seafarers, and the results showed that the prevalence of overweight and obesity was 66.0%.

Thus, the prevalence of overweight and obesity among seafarers is higher than that of adults living on land in Vietnam. To explain this, we think that each voyage usually lasts 9–12 months (in Vietnam, seafaring labour contracts for seafarers usually last from 9 to 12 months), the nutritional conditions on the ship are unbalanced: excess protein, fat and glucose but lack of green vegetables and fibre. On the other hand, seafarers working in shifts, have a lot of free time, and lack of training facilities on board, so the prevalence of overweight and obesity is higher. The Oldenburg's et al. study [25] on the nutritional status of seafarers also resembles our results. Zyriax et al. [26] studied the diets of crew members on four German merchant ships and found that the total amount of meat, fat

Table 4. Multivariate analysis of factors related to seafarers' hypertension

Variable	Total	Seafarer with hypertension N (%)	Seafarer without hypertension N (%)	Adjusted OR (95% CI)	P-value
Job duration at sea:					
> 10 years	364	198 (54.4)	166 (45.6)	8.23 (4.34–17.27)	< 0.001
≤ 10 years	344	35 (10.2)	309 (89.8)		
Education level:					
Intermediate level	367	115 (31.3)	252 (68.7)	1.15 (0.54–1.87)	0.642
University/ College	341	118 (34.6)	223 (65.4)		
Rank:					
Non-officer	486	181 (37.2)	305 (62.8)	2.11 (1.45–2.82)	< 0.001
Officer	222	52 (23.4)	170 (76.6)		
Workplace group:					
Other crews	138	36 (26.1)	102 (73.9)	Control group	
Engine room crew	220	98 (44.6)	122 (55.4)	2.11 (1.45–3.58)	< 0.001
Deck crew	350	99 (28.3)	251 (71.7)	1.18 (0.86–1.72)	0.625
WHR:					
≥ 0.90	338	159 (47.0)	179 (53.0)	9.12 (4.23–18.45)	< 0.001
< 0.90	370	74 (22.0)	296 (80.0)		
BMI:					
< 23	385	88 (22.9)	297 (77.1)	Control group	
23–24.9	229	96 (41.9)	133 (58.1)	2.24 (1.51–3.27)	< 0.001
≥ 25	94	49 (52.1)	45 (47.9)	3.34 (2.15–5.63)	< 0.001
Current smokers:					
Yes	232	89 (38.4)	143 (61.6)	1.32 (1.02–1.99)	0.041
No	476	144 (30.3)	322 (69.7)		
Alcohol abuse:					
Yes	490	185 (37.8)	305 (62.2)	2.10 (1.42–3.26)	< 0.001
No	218	48 (22.0)	170 (78.0)		
Regular exercise:					
No	499	177 (35.5)	322 (64.5)	1.43 (1.03–2.18)	0.035
Yes	209	56 (26.8)	153 (73.2)		
Anxiety:					
Yes	227	93 (41.5)	131 (58.5)	1.56 (1.08–2.27)	0.019
No	481	140 (28.9)	344 (71.7)		

BMI – body mass index; CI – confidence interval; OR – odds ratio; WHR – waist/hip ratio

and eggs provided more than doubled, while the proportion of fruits, vegetables, dairy products and cereals much lower than recommended.

The present study of 708 seafarers (Table 3), showed that the prevalence of hypertension was 32.9%; of which, grade I hypertension accounted for 25.1% and grade II hyper-

tension for 7.8%. The results of our study are consistent with the study of some authors on seafarers in different countries about the prevalence of hypertension. Tu and Jepsen [6] studied 629 Danish seafarers in 2016 and found that the prevalence of seafarer with hypertension was 44.7%. Sagaro et al. [27] studied 603 seafarers, and the results

showed that the prevalence of hypertension and prehypertension was 39% and 16.6%. Pougnet's study [10] of European seafarers showed a prevalence of hypertension of 30.1%.

The prevalence of hypertension among seafarers is higher than that of adults living on land in Vietnam [12, 19, 28]. Meiqari et al. [28] in a review of 10 studies in Vietnam showed that the prevalence of hypertension was 21.1%. Do et al. [12] surveyed 17,199 subjects aged 25–64; the prevalence of hypertension was 20.7%. McGuire et al. [11] surveyed 121,273 people over 40 years old in Ho Chi Minh City, Vietnam; the prevalence of hypertension was 25.1%. Hoang et al. [5] surveyed 3,856 people aged 18–69 and showed that the prevalence of hypertension was 18.9%. Quoc Cuong et al. [21] did a cross-sectional study on 2,203 women and men in Vietnam aged 18 years and older; the prevalence of hypertension was 24.3% (20.9% in female and 20.9% in male participants) 29.1%). Hien et al. [29] studied 969 people living in urban Vietnam, from 40 to 69 years old, and the prevalence of hypertension was 44.8%. This prevalence was higher in men than in women (51.3% vs. 39.7%, $p < 0.001$). In a cross-sectional study conducted in Malaysia on subjects 18 years of age and older, the prevalence of hypertension was 34.6% in 2006, 33.6% in 2011 and 35.3% in 2015 [30].

The question arises why seafarers have higher prevalence of hypertension than labour on land in Vietnam. To explain this, we and some authors believe that seafaring is a particularly strenuous profession. During the voyage at sea, the seafarer not only have to endure the harsh conditions of the marine climate such as waves, wind, sudden climate change when the ship passes through areas with different weather, different time zones in a short time, making it difficult for the seafarer's body to adapt, but also the micro-conditions of the ships has many disadvantages for the crew's health, such as vibration, shaking, high fuel vapor. In addition, seafarers also have to bear mental and psychological burdens such as isolation from the mainland, being away from family, lack of cultural life, working in tight spaces, constrained posture, especially they must live and work for a long time in a same-sex society [9, 12]. All of these things cause a state of constant stress that lasts and strengthens the sympathetic nervous system, thereby causing a rapid heart rate and increased blood pressure.

Seven hundred eight seafarers were interviewed directly about a number of factors related to hypertension such as age, educational level, rank and title on board, overweight, obesity, smoking, alcohol consumption, exercise, anxiety symptoms. Research results (Table 4) show that seafarers with job duration at sea over 10 years have an 8.23 times higher risk of hypertension than seafarers with job duration at sea under 10 years (95% CI 4.34–17.27; $p < 0.001$).

This result is consistent with the study of Sagaro et al. [31]. The job duration at sea of over 10 years had a higher risk of hypertension (OR = 2.73, 95% CI 2.09–3.57). Non-officer seafarers had a higher risk of developing hypertension than officer (OR = 2.11, 95% CI 1.45–2.82, $p < 0.001$). The results of this study are consistent with the research of some authors. The study by Sagaro et al. [27] conducted on 4,318 seafarers aged from 18 to 70 years old showed that there is a relationship between the non-officer and hypertension (OR = 1.36, 95% CI 1.09–1.70). Another Sagaro's study [31] researched on 603 seafarers about the association between BMI and hypertension also found that non-officers had a higher prevalence of hypertension compared with officers (55.6% and 44.4%). To explain this, we believed that non-officers often have higher physical efforts, combined with obstacles in their ranks on board, low income, more stress due to greater responsibilities. Therefore, the prevalence of hypertension of non-officers is higher than officers.

Table 4 shows that the engine room group have a higher risk of hypertension than seafarers with other groups (service, electrical) (OR = 2.11, 95% CI 1.45–3.58, $p < 0.001$). Research by David et al. [32] on 455 seafarers aged 40–55 (164 mechanics and 291 mariners) showed the prevalence of hypertension of engine room crew was 18.90% compared with 11.68% in deck crew ($p < 0.05$). The risk of hypertension is directly related to exposure to high noise levels > 85 dB(A) and duration of noise exposure for more than 20 years [32]. Skogstad et al. [9] pooled results from 12 articles, which showed that noise exposure in the workplace was positively associated with hypertension (OR = 1.68; 95% CI 1.10–2.57) and increased cardiovascular risk (OR = 1.34, 95% CI 1.15–1.56).

The study results (Table 4) showed that obese seafarers had a higher risk of developing hypertension (OR = 3.34, 95% CI 2.15–5.63). A study by Chowdhury et al. [33] on 7,839 adults over the age of 35 showed that being overweight or obese increases the risk of hypertension (OR = 2.19, 95% CI 1.87–2.57). Quoc Cuong's research [21] on people over 18 years old also showed that overweight, obesity, and high WHR were related to hypertension (OR = 1.64, $p = 0.005$ and OR = 2.07, $p < 0.001$). Research by some other authors also show an association between overweight, obesity and hypertension of seafarers [7, 23, 24].

Alcohol abuse and smoking increases the risk of hypertension for seafarers (OR = 2.10, 95% CI 1.42–3.26, $p < 0.01$ and OR = 1.32, 95% CI 1.02–1.99, $p = 0.041$) (Table 4). Tu and Jepsen [6] studied Danish seafarers and found that hypertension is strongly associated with alcohol abuse and smoking. Quoc Cuong's research [21] on Vietnamese people also shows that smoking and alcohol abuse increase the risk of hypertension (OR = 1.78, 95%

CI 1.40–2.25, $p < 0.01$ and OR = 1.40, 95% CI 1.12–1.75, $p = 0.003$) [21]. A study by Lee et al. [34] showed that smokers have a higher risk of hypertension than non-smokers (OR = 1.9, 95% CI 1.1–3.7). Moderate alcohol consumption reduces the risk of metabolic syndrome, but alcohol abuse increases the risk of metabolic syndrome, including hypertension.

According to WHO and the American Heart Association, physical activity includes regular activities and exercise: regular exercise 30 minutes/day with moderate intensity, at least 5 days/week, i.e. 150 minutes/week or at high intensity for at least 75 minutes/week. Regular exercise is considered a preventive therapy for hypertension, whereas sedentary lifestyle is considered to be the cause of 5–13% of current cases of hypertension [1, 18]. The results of the study in Table 4 show that irregular exercise is a risk factor for hypertension (OR = 1.43, 95% CI 1.03–2.18). Research results are consistent with some authors [24].

During the sea voyage, the seafarers are isolated from the daily social life on land. All their activities are limited in the narrow space of the ship. On the other hand, the micro-society environment on board ships is a special environment, with only one gender (same-sex society), difference in rank and rank on board, working in shift, and disproportionate social benefits create a psychophysical burden for seafarers. Research results (Table 4) show that anxiety is a risk factor for hypertension (OR = 1.56, 95% CI 1.08–2.27). The results of our study are consistent with those of Stansfeld and Candy [8] and Oldenburg et al. [25].

LIMITATIONS OF THE STUDY

The study was conducted on 708 Vietnamese seafarers working onboard merchant ship about the prevalence of hypertension and some related factors. However, some risk factors for hypertension in seafarers have not been analysed: diet, nutrition on board; sleep disorders, seafarers with a history of smoking were also unexplored.

CONCLUSIONS

Hypertension is a health problem for Vietnamese seafarers. This disease tends to be seen in young seafarers and the incidence is higher than adults in the mainland. In order to prevent and minimise the risk factors for hypertension in seafarers, it is necessary to adjust the lifestyle such as less intake of salt, limiting beer, alcohol and smoking; exercise regularly, reduce weight; improve psychological problems on board. Seafarers suffering from high blood pressure on the sea voyage should be controlled and take medicine regularly.

Conflict of interest: None declared

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