Original Article

Prevalence and associated factors of diabetes mellitus among Vietnamese seafarers aboard merchant vessels

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ABSTRACT

Introduction: Diabetes mellitus (DM) is a non-communicable, chronic disease that poses a leading burden of morbidity and mortality globally. Seafarers are specific labor exposed to various risk factors for diabetes, such as prolonged journeys, imbalanced nutrition, physical inactivity, and stress. This study aimed to determine the prevalence and associated factors of DM among Vietnamese seafarers aboard merchant vessels.

Methods: This cross-sectional descriptive study was conducted by measuring fasting blood glucose levels of 1,290 male Vietnamese seafarers before they went to sea, from February to October 2024. Face-to-face interviews were conducted with participants regarding their age, work experience, education level, work site, rank, smoking habits, family history of DM, alcohol consumption, regular exercise, and symptoms of depression to identify associated factors.

Results: The mean age of the participants was 31.2 ± 10.6 years. The prevalence of DM and pre-diabetes was 5.4% and 22.3%, respectively. Associated factors with DM include having an age of 40 or more (OR = 2.83; 95%CI: 1.51-5.12); work experience ranging from 10 to 19 years (OR = 2.32; 95%CI: 1.25-4.31), work experience ≥ 20 years (OR = 3.05; 95%CI: 1.61-6.22) compared with less than 10 years, family history of diabetes (OR = 1.78; 95%CI: 1.04-3.22), non-officer (OR =1.98; 95%CI: 1.01-3.92), obesity (OR = 2.28; 95%CI: 1.56-3.89), hypertension (OR = 1.70; 95%CI: 1.04-2.79), dyslipidemia (OR = 1.98; 95%CI: 1.10-3.31), abdominal obesity (OR = 2.34; 95%CI: 1.25-3.81), symptoms of depression (OR =1.66; 95%CI: 1.02-2.73), regular exercise (OR = 0.65; 95%CI: 0.41-0.93), alcohol consumption in moderation (OR = 0.62; 95%CI: 0.41-0.83).

Conclusion: DM and pre-diabetes are public health problems affecting Vietnamese seafarers. It is necessary to implement educational programs, promote healthy lifestyles, and encourage regular health check-ups to enable the early detection of diabetes and its complications.

Keywords: Associated factors, diabetes mellitus, seafarers, Vietnam

Introduction

Diabetes mellitus (DM) is a non-communicable, chronic disease characterized by high blood sugar levels, due to insufficient insulin production by the pancreas, insulin resistance, or both. It is one of the four most common non-communicable diseases that lead to disability and high mortality worldwide (after cardiovascular diseases, cancer, and chronic respiratory diseases).[1,2] DM is a community-wide disease that affects the quality of life of patients and is the

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leading cause of complications such as blindness, kidney failure, heart attacks, stroke, and amputations.[3] The disease is on the rise globally; according to the International Diabetes Federation (IDF), there were 415 million adults with diabetes in 2015, 451 million in 2017, and the forecast increase to 693 million by 2045.[4] The prevalence of DM tends to increase with age, with approximately 5% among those aged 35 to 39 years, 10% at age 45–49, 15% at age 55–59, and 20% at age 60–69.[5]

Seafaring is an exceptionally laborious and specialized occupation. During their journeys at sea, the ship serves as both a living space and a workplace for the crew. Working conditions at sea are extremely challenging, often requiring individuals to labor under harsh natural conditions, such as high waves, strong winds, and unsafe working environments characterized by vibrations, noise, high temperatures, humidity, and slippery surfaces.[6–8] Additionally, the duration of each voyage for seafarers typically lasts from 6 to 9 months, and sometimes even longer. During their time working at sea, they endure feelings of loneliness and isolation from the mainland, work in shifts, experience unbalanced nutrition, limited physical activity, and prolonged psychological stress.[9,10] These factors contribute to the risk of metabolic diseases, including diabetes, among seafarers.[11,12] Some studies indicate that the prevalence of diabetes among seafarers is higher than that in the general population on land.[11,13]

Sagaro GG et al analyzed 21 articles published in PubMed/Medline, Scopus, Google Scholar, and Web of Science, and the results indicated that the prevalence of DM among seafarers was 12.7%.[11] Another study by Fereshteh Baygi et al on Iranian seafarers, with an average age of 36.0 ± 10.3 years, found that the prevalence of metabolic syndrome was 14.9%, with DM occurring in 23.1% of the participants.[13]

Vietnam is a country with a large number of seafarers, approximately 540,000. Currently, there is a lack of studies and data on the prevalence of DM among seafarers. Therefore, this study aims to determine the prevalence and associated factors of diabetes among Vietnamese seafarers. The research findings will provide scientific evidence to support the development of appropriate preventive measures and health management strategies, ultimately contributing to the improvement of the quality of life for seafarers.

Methods

The study included 1,290 Vietnamese seafarers with at least 2 working experience, working on aboard merchant vessels. They underwent health examinations at the Institute of Maritime Medicine before embarking on their voyages between February 2024 and October 2024. The participants were divided into three groups: deck, engine and other seafarers (such as electrical and service personnel).

This was a cross-sectional descriptive epidemiological study.

The sample size was calculated based on the formula for estimating the sample size for a proportion:

$$n = Z^2_{1-\frac{\alpha}{2}} \frac{p(1-p)}{(p.\varepsilon)^2}$$

In which Z: the level of confidence level of 95%, Z = 1.96; p: is the estimated prevalence of DM from a previous study. The prevalence of self-reported diabetes among seafarers was 8.5%.[12] chose ε = 0.2. n (minimum sample size) = 1075 participants. To increase reliability, the minimum sample was multiplied by 1.2, resulting in the final sample size of n = 1290.

A list of Vietnamese seafarers who underwent health examinations and management at the Institute of Maritime Medicine in 2024 was made. Using a systematic random sampling method, a total of 1,290 seafarers were selected for the study.

The study participants underwent clinical examinations, which included measurements of height, weight, waist circumference, hip circumference, and blood pressure. Seafarers

were required to rest for 10 minutes prior to the examination and were instructed to refrain from using stimulants such as alcohol, beer, coffee, and tobacco.

Fasting blood samples were collected to quantify blood glucose, HbA1c, total cholesterol, triglycerides, high-density lipoprotein cholesterol (HDL-C), and low-density lipoprotein cholesterol (LDL-C). Fasting venous blood was taken in the morning (at least 8 hours after the last meal) and was analyzed at the Biochemistry Laboratory of the Institute of Marine Medicine using the Beckman Coulter AU 480 automatic biochemical analyzer based on the Electrochemical principle of luminescence.

Direct interview method was used to identify factors associated with diabetes among seafarers.

According to the American Diabetes Association (2021) (ADA), meeting one of the following four criteria makes one a diabetic: (1) fasting plasma glucose (FPG) ≥ 126 mg/dl (≥7.0 mmol /l), (2) 2-hour plasma glucose (PG) ≥ 200 mg/dL (11.1 mmol/L) during oral glucose tolerance test (OGTT), (3) HbA1c ≥ 6.5% (48 mmol/mol) and (4) Random plasma glucose (PG) ≥ 200 mg/dL (11.1 mmol/L) in persons with symptoms of hyperglycemia or hyperglycemic crisis.[14] In this study, DM was diagnosed when fasting plasma glucose was ≥126 mg/dl (≥7.0 mmol/l) or HbA1c was ≥6.5% (48 mmol/mol) or an existing diagnosis of DM and previous DM treatment were present. Prediabetes was defined as HbA1c between 5.7% and 6.4% or FPG between 5.6 and 6.9 mmol/L.

Hypertension was defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg or being treated with antihypertensive drugs.[15]

Dyslipidemia was considered prevalent when one or more of the following parameters were met: total cholesterol > 5.2 mmol/L (200 mg/dL); triglycerides > 1.7 mmol/L (150 mg/dL), LDL-cholesterol > 2.3 mmol/L (>200 mg/dL), and HDL-cholesterol < 1.03 mmol/L (40 mmol/dL).[16]

The assessment of overweight and obesity was based on BMI (body mass index), calculated using the formula weight (kg)/height (m²) according to WHO standards for Asian adults.[17] Underweight is defined as BMI <18.5 kg/m², normal weight as BMI 18.50–22.9 kg/m², overweight as BMI 23.00–24.9 kg/m², and obesity as BMI ≥25 kg/m².

The assessment of abdominal obesity was based on waist-hip ratio (WHR). According to WHO standards applicable to the Asia-Pacific region, abdominal obesity was defined as WHR ≥ 0.90 (males), WHR ≥ 0.85 (females).[18]

Alcohol consumption (beer, wine): Drinking alcohol at harmful levels represented an average consumption of ≥60 g of alcohol/day for men and ≥40 g of alcohol/day for women; Drinking alcohol at a high risk involved an average consumption of approximately 40–59.9 g of alcohol/day in men and 20–39.9 g of alcohol/day in women. If the above two criteria were not satisfied, participants were categorized as drinking alcohol at the permissible level. The number of grams of alcohol was estimated as follows: Participants were asked about the number of times of drinking alcohol in 7 days and the number of alcohol units in each drink. The average amount of alcohol consumed in 7 days was calculated: [(number of drinks in 7 days) × (number of alcohol units in each drink)]/7. One unit of alcohol is equivalent to 10 grams of alcohol (equivalent to 285 ml of beer, 30 ml of spirits, or 120 ml of light wine).[19]

Assessment of depressive symptoms among seafarers was based on the PHQ-9 (Patient Health Questionnaire-9) scale, which is widely used in Vietnam to assess depressive symptoms in the community. Sensitivity and specificity were 87.8% and 88.0% at the cut-off score of 4, with Cronbach's alpha at 0.745 (p < 0.001).[20]

The participants were interviewed about exercise status such as (walking, playing table tennis, gym, etc.) per week. Regular physical activity is defined as engaging in at least 30 minutes of physical activity per day for ≥ 5 days per week;

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irregular physical activity is defined as 1-4 days per week.[21]

The research data were processed through biomedical statistical methods based on SPSS software for Windows 22.0. Frequency and percent distribution were used to describe qualitative variables. The chi-square test was used to compare two ratios. Mean values were used to describe quantitative variables. The adjusted odds ratio (*AOR*) and 95% confidence interval (*CI*) were used to determine the association between risk factors for DM in seafarers. Risk factors were identified through multivariate logistic regression analysis, with a dependent binary variable about having DM (yes/no). Risk factor variables in the model comprised age group, work experience, education level, family history of diabetes, BMI, hypertension, dyslipidemia, obesity, regular exercise, current smokers, alcohol consumption, and depression symptoms.

This study has been approved by the Ethics Committee in Biomedical Research of the Maritime Medical Institute under decision 05/2024/QĐ-YHB. Participation in the study was entirely voluntary for all seafarers.

Results

This study analyzed 1,290 Vietnamese seafarers working on aboard merchant vessels to determine the prevalence of DM and associated factors of DM. The results are as follows:

Table 1: Characteristics of the study participants (n = 1290)

Variable		No (%)
Gender	Male	1290 (100.0)
	Female	0 (0)
Age (years)	20-29	442 (34.3)
	30-39	557 (43.2)
	≥40	291 (22.5)
	Mean ± SD	**31.2 ± 10.6**
Working experience (years)	< 10	532 (41.2)
	10-19	557 (43.2)
	≥ 20	201 (15.6)
	Mean ± SD	**11.5 ± 5.8**
Educational level	Intermediate	1017 (78.8)
	College/university	273 (21.2)
Work site	Deck	537 (41.6)
	Engine	498 (38.6)
	Other crews	255 (19.8)
Rank of seafarers	Officer	317 (24.6)
	Non-officer	973 (75.4)

Note: SD = standard deviation; No. = number

The study (Table 1) showed that 100% of participants were male. The mean age of the participants was 31.2 ± 10.6 years; with 20 – 29 years 34.3%, 30 – 39 years 43.2%, ≥ 40 years 22.5%.

The mean working experience was 11.5 ± 5.8 years, with 41.2% having less than 10 years of experience; with < 10 years 41.2%, 11 – 20 years 43.2%, ≥ 20 years 15.6%. The education level of

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participants is mostly intermediate (78.8%) and college/university (21.2%). The workplace on the ship included deck (24.6%); engine (38.6%); and other seafarers such as electrical and service (19.8%). The rank of seafarers: officers (35.0%); non-officers (75.4%).The prevalence of DM and prediabetes among the seafarers was 5.4% and 22.3%, respectively (Figure 1).
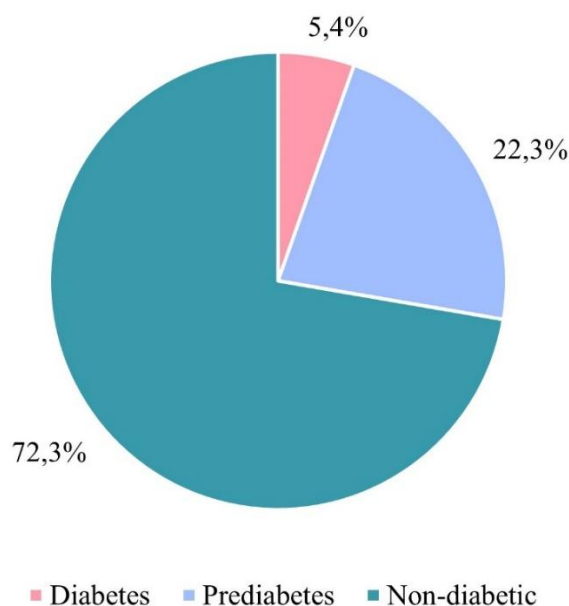

Figure 1: The prevalence of diabetes mellitus and pre diabetes among seafarers (n = 1290)

Table 2: Multivariate logistic regression analyses of associated factors to diabetes mellitus among seafarers

Variable	n	With DM n (%)	Without DM n (%)	AOR (95%CI)	p-value
Age (years)					
20-29	442	15(3.4)	427 (96.6)	1	
30-39	557	28(5.0)	529(95.0)	1.62 (0.89-2.71)	0.215
≥40	291	26(8.9)	265(91.1)	2.83 (1.51-5.12)	0.004
Work experience (years)					
< 10	532	15 (2.8)	517 (97.2)	1	
10-19	557	37 (6.6)	520 (93.4)	2.32 (1.25-4.31)	0.010
≥ 20	201	17 (8.5)	184 (91.5)	3.05 (1.61-6.22)	0.002
Educational level					
Intermediate	1017	54 (5.3)	963 (94.7)	1.06	0.915
University	273	15 (5.5)	258 (94.5)	(0.62-1.84)	
Family history of DM					
No	1103	53 (4,8)	1050 (95.2)	1,78	0.045
Yes	187	16 (8,6)	171 (91.4)	(1.04-3.22)	
Rank of seafarers					
Officer	317	9 (2.8)	308 (97.2)	1.98	0.046
Non-officer	973	60 (6.2)	913 (93.8)	(1.01-3.92)	
Work site					

Variable	n	With DM n (%)	Without DM n (%)	AOR (95%CI)	p-value
Other crews	255	14 (5.5)	241 (94.5)	1	
Deck	537	28 (5.2)	509 (94.8)	0.97 (0.53-1.81)	0.852
Engine	498	27 (5.4)	471 (94.6)	0.99 (0.50-1.89)	0.986
Body mass index					
Normal	958	38 (4.0)	920 (96.0)	2.28 (1.56-3.89)	<0.001
Overweight and obesity	332	31 (9.3)	301 (90.7)		
Hypertension					
No	896	39 (4.4)	857 (95.6)	1.70 (1.04-2.79)	0.033
Yes	394	30 (7.6)	364 (92.4)		
Dyslipidemia					
No	577	21 (3.6)	556 (96.4)	1.98 (1.10-3.31)	0.029
Yes	713	48 (6.7)	665 (93.3)		
Abdominal obesity					
No	899	35 (3.9)	864 (96.1)	2.34 (1.25-3.81)	<0.001
Yes	391	34 (8.7)	357 (91.3)		
Regular exercise					
No	419	30 (7.2)	389 (92.8)	0.65 (0.41-0.93)	0.041
Yes	871	39 (4.5)	832 (95.5)		
Current smoking					
No	1006	52 (5.2)	954 (94.8)	1.21 (0.81-2.06)	0.617
Yes	284	17 (6.0)	267 (94.0)		
Alcohol consumption					
No alcohol	276	19 (6.9)	257 (93.1)	1	
Alcohol consumption in moderation	712	29 (4.1)	683 (95.6)	0.62 (0.41-0.83)	0.001
Harmful use of alcohol	302	21 (7.0)	281 (93.0)	1.05 (0.62-1.82)	0.877
Depression symptoms					
No	906	40 (4.4)	866 (95.6)	1.66 (1.02-2.73)	0.039
Yes	384	29 (7.6)	355 (92.4)		

Note: AOR = Adjusted odds ratio, CI: Confidence Interval

Multivariate logistic regression analyses of associated factors with DM among seafarers revealed several identified factors, including Age ≥ 40 years (OR = 2.83; 95% CI: 1.51–5.12, p = 0.004) compared to those under 30 years; working experience 10 - 19 years (OR = 2.32; 95% CI: 1.25–4.31, p = 0.01) and ≥ 20 years (OR = 3.05; 95% CI: 1.61–6.22, p = 0.002) compared to less than 10 years; family history of DM (OR = 1.78; 95% CI: 1.04–3.22, p = 0.045); non-officer (OR = 1.98; 95% CI: 1.01–3.92, p = 0.046); overweight and obesity (OR = 2.28; 95% CI: 1.56–3.89, p < 0.001); hypertension (OR = 1.70; 95% CI: 1.04 – 2.79, p = 0.033). dyslipidemia (OR = 1.98; 95% CI: 1.10–3.31, p = 0.029); abdominal obesity (OR = 2.34; 95% CI: 1.25–3.81, p < 0.001); symptoms of depression (OR = 1.66; 95% CI: 1.02–2.73, p = 0.039). Regular physical exercise (OR = 0.65; 95% CI: 0.41–0.93, p = 0.041) and alcohol consumption in moderation (OR = 0.62; 95% CI: 0.41–0.83, p = 0.001) were associated with a reduced risk of diabetes. There was no significant association between DM with educational level, work site, alcohol abuse (Table 2).

Discussion

Diabetes mellitus is a chronic, non-communicable disease with an increasing prevalence in Vietnam and globally. It is a leading cause of mortality, disability, and healthcare burden.[2,3]

Seafarers are a unique labor group, characterized by 100% male participation. Their work involves long voyages away from family, shift-based schedules, and imbalanced diets, combined with prolonged stress, these are risk factors for metabolic disorders, including diabetes.[9,22] A cross-sectional study was conducted by measuring fasting blood glucose levels in 1,290 seafarers before embarking on voyages. The results (Figure 1) revealed that the prevalence of diabetes and prediabetes was 5.4% and 22.3%, respectively.

When stratified by age groups, the prevalence of DM among seafarers in this study was higher than that observed in certain land-based populations.[5,23,24] However, it was lower than the prevalence reported in other studies conducted on seafarer populations.[11,13]

In a study by Sagaro GG et al. involving 2,986 seafarers aged 18 years and older (mean age 37.96 ± 10.22), the prevalence of DM was 8.2%.[12] In another study by Baygi F et al. on Iranian seafarers (mean age 36.0 ± 10.3), the prevalence of metabolic syndrome was 14.9%, with DM was 23.1%.[13] To explain the difference in findings, that the mean age of the seafarers in this study (31.2 ± 10.6 years) was lower compared to those in the aforementioned studies, and the lower working experience might result in a lower risk of DM.

The multivariate analysis of associated factors to DM among seafarers (Table 2) shows that both age and work experience among seafarers are associated with DM. Previous studies have also found that age is an important factor, especially in individuals over 40 years old.[12,25] The risk of developing DM increases with age, likely due to biological factors such as reduced insulin sensitivity, decreased function of pancreatic beta cells, and the accumulation of risks over time, including obesity and dyslipidemia. People over 40 years of age are at higher risk due to prolonged exposure to adverse factors in the occupational environment.[26,27]

A family history of DM increases the risk of developing the disease by 1.78 times compared to individuals without a family history of DM. This finding aligns with previous studies, which have also demonstrated that having a family history of DM significantly raises the risk of developing the condition.[25,28] A family history of DM is considered a critical risk factor; individuals with parents or siblings diagnosed with DM are 2 to 6 times more likely to develop the disease compared to those without such a family history.[29]

Non-officer seafarers have a 1.98 times higher risk of developing DM compared to officer seafarers. This finding is consistent with the study by Sagaro GG et al., which reported that non-officer seafarers had a 1.36 times higher risk of DM (95% CI: 1.09–1.70).[12] Non-officer seafarers often face monotonous work, shift schedules, frequent overtime, insufficient rest, and stressful working conditions.[9,12] These are known risk factors for DM. The results (Table 2) also indicate that being overweight, obese, or having abdominal obesity increases the risk of DM among seafarers. This can be explained by the close association of these conditions with insulin resistance, which leads to a relative insulin deficiency due to a reduction in the number of receptors in peripheral tissues. Several other studies have similarly found that overweight, obesity, and abdominal obesity significantly raise the risk of developing DM.[13,30]

Dyslipidemia increases the risk of developing DM by 1.75 times compared to individuals without dyslipidemia. A study by Uehara A et al. on Japanese workers demonstrated a strong association between dyslipidemia and DM.[30] Another study also confirmed that dyslipidemia significantly elevates the risk of developing DM.[31]

Seafarers who exercise regularly have a reduced risk of developing diabetes (OR = 0.65; 95% CI: 0.41–0.93). This finding is consistent with the

results of other studies.[30,31] Regular exercise helps lower plasma glucose levels in DM patients, stabilize blood lipid levels and blood pressure, improve insulin resistance, and enhance psychological well-being. These combined benefits contribute to a reduced risk of developing DM. Moderate alcohol consumption (beer or wine) reduces the risk of developing diabetes compared to not drinking alcohol (OR = 0.62; 95% CI: 0.41–0.83). However, alcohol abuse has not been shown to be associated with an increased risk of DM. A study by Shi L et al. on 51,464 Chinese men found that moderate alcohol consumption (1–3 drinks per day) is inversely associated with the risk of developing diabetes mellitus (OR = 0.80; 95% CI: 0.67–0.94).[32]

Seafarers with depressive symptoms have a 1.66 times higher risk of developing DM compared to those without depressive symptoms. This finding is consistent with studies by other authors.[31,33] This can be explained by the fact that depressive symptoms activate the hypothalamic-pituitary-adrenal axis, leading to inflammation, sleep disturbances, a sedentary lifestyle, unhealthy eating habits, and environmental and cultural

risk factors, all of which contribute to an increased risk of DM.[34] Thus, depression increases the risk of developing DM, and conversely, DM increases the risk of developing depressive symptoms.

Conclusions

Diabetes mellitus (DM) and pre-diabetes are public health problems affecting Vietnamese seafarers, with a prevalence was 5.4% and 22.3%, respectively. Associated factors with DM include being 40 years of age or more, having at least 10 years of work experience, a family history of diabetes, non-officer status, obesity, abdominal obesity, hypertension, dyslipidemia, irregular exercise, and symptoms of depression. It is essential to implement health education and intervention programs aimed at reducing the prevalence of DM within the seafaring community. These programs should particularly focus on promoting healthy lifestyles and encouraging regular health check-ups to enable early detection of DM and its complications.

Conflicts of interest

There are no conflicts of interest.

References

1. American Diabetes Association; Diagnosis and Classification of Diabetes Mellitus. Diabetes Care [Internet]. 2009 Jan;32(Suppl 1):S62–7. Available from: https://doi.org/10.2337/dc09-S062

2. Global Burden of Disease 2021 Diabetes Collaborators. Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: a systematic analysis for the Global Burden of Disease Study 2021. Lancet Lond Engl. 2023;402(10397):203–34. Available from: https://doi.org/10.1016/S0140-6736(23)01301-6

3. World Health Organization; Diabetes [Internet]. 2023 [cited 2024Dec 3]. Available from: https://www.who.int/news-room/fact-sheets/detail/diabetes

4. Cho NH, Shaw JE, Karuranga S, Huang Y, da Rocha Fernandes JD, Ohlrogge AW, et al. IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. Diabetes Res Clin Pract. 2018;138:271–81. Available from: https://doi.org/10.1016/j.diabres.2018.02.023

5. Standl E, Khunti K, Hansen TB, Schnell O. The global epidemics of diabetes in the 21st century: Current situation and perspectives.Eur J Prev Cardiol. 2019;26(2_suppl):7–14. Available from: https://doi.org/10.1177/2047487319881021

6. Oldenburg M, Baur X, Schlaich C. Occupational risks and challenges of seafaring. J Occup Health. 2010;52(5):249–56. Available from: https://doi.org/10.1539/joh.k10004

7. Skogstad M, Johannessen HA, Tynes T, Mehlum IS, Nordby KC, Lie A. Systematic review of the cardiovascular effects of occupational noise. Occup Med Oxf Engl. 2016;66(1):10–6. Available from: https://doi.org/10.1093/occmed/kqv148

Int. J. Occup. Safety Health, Volume 15, No 4 (2025), 370-379

https://www.nepjol.info/index.php/IJOSH

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8. Nguyen VT, Nguyen BN, Nguyen TS, Tran QC, Ho VH, Nguyen HH. Prevalence of Accidents and Injuries and Related Factors of Fishermen Fishing Offshore in the North of Vietnam. Int J Occup Saf Health. 2024;14(2):228–36. Available from: https://doi.org/ 10.3126/ijosh.v14i2.56367

9. Hai HNT, Bao NN, Truong SN, Van TN. Characteristics the Living, Working Conditions, and Nutrition of Seafarers Working on Transoceanic Ships: A Cross-sectional Study. J Mar Med Soc. 2024;26(3):404–9. Available from: https://doi.org/10.4103/jmms.jmms_152_23

10. Brooks SK, Greenberg N. Mental health and psychological wellbeing of maritime personnel: a systematic review. BMC Psychol.2022;10(1):139. Available from: https://doi.org/10.1186/s40359-022-00850-4

11. Sagaro GG, Angeloni U, Marotta C, Nittari G, Rezza G, Silenzi A, et al. The Magnitude of Cardiovascular Disease Risk Factors in Seafarers from 1994 to 2021: A Systematic Review and Meta-Analysis. J Pers Med. 2023;13(5):861. Available from: https://doi.org/10.3390/jpm13050861

12. Sagaro GG, Battineni G, Di Canio M, Amenta F. Self-Reported Modifiable Risk Factors of Cardiovascular Disease among Seafarers: A Cross-Sectional Study of Prevalence and Clustering. J Pers Med. 2021;11(6):512. Available from: https://doi.org/10.3390/jpm11060512

13. Baygi F, Jensen OC, Qorbani M, Farshad A, Salehi SA, Mohammadi-Nasrabadi F, et al. Prevalence and associated factors of cardio-metabolic risk factors in Iranian seafarers. Int Marit Health. 2016;67(2):59–65. Available from: https://doi.org/10.5603/IMH.2016.0013

14. American Diabetes Association Professional Practice Committee. Diagnosis and Classification of Diabetes: Standards of Care in Diabetes-2024. Diabetes Care [Internet]. 2023;47(Supplement_1):S20–42. Available from: https://doi.org/10.2337/dc24-S002

15. Unger T, Borghi C, Charchar F, Khan NA, Poulter NR, Prabhakaran D, et al. 2020 International Society of Hypertension Global Hypertension Practice Guidelines. Hypertens Dallas Tex 1979. 2020;75(6):1334–57. Available from: https://doi.org/10.1161/HYPERTENSIONAHA.120.15026

16. Pearson GJ, Thanassoulis G, Anderson TJ, Barry AR, Couture P, Dayan N, et al. 2021 Canadian Cardiovascular Society Guidelines for the Management of Dyslipidemia for the Prevention of Cardiovascular Disease in Adults. Can J Cardiol. 2021;37(8):1129–50. Available from: https://doi.org/10.1016/j.cjca.2021.03.016

17. World Health Organization Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. Lancet Lond Engl. 2004;363(9403):157–63. Available from: https://doi.org/10.1016/S0140-6736(03)15268-3

18. World Health Organization. Waist circumference and waist-hip ratio: report of a WHO expert consultation, Geneva, 8-11 December 2008. 2011. Available from: https://www.who.int/publications/i/item/9789241501491

19. Rehm J, Greenfield TK, Walsh G, Xie X, Robson L, Single E. Assessment methods for alcohol consumption, prevalence of high risk drinking and harm: a sensitivity analysis. Int J Epidemiol. 1999;28(2):219–24. Available from: https://doi.org/10.1093/ije/28.2.219

20. Phi HNY, Manh BX, Ngoc TA, Chau PTM, Tho TQ, Nghia NT, et al. Psychometric Properties of Vietnamese Versions of the Clinician-Rated and Self-Reported Quick Inventory of Depressive Symptomatology and the Patient Health Questionnaire.East Asian Arch Psychiatry Off J Hong Kong Coll Psychiatr Dong Ya Jing Shen Ke Xue Zhi Xianggang Jing Shen Ke Yi Xue Yuan Qi Kan. 2023;33(2):65–70. Available from: https://doi.org/10.12809/eaap2258

21. Haskell WL, Lee IM, Pate RR, Powell KE, Blair SN, Franklin BA, et al. Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the

Int. J. Occup. Safety Health, Volume 15, No 4 (2025), 370-379

https://www.nepjol.info/index.php/IJOSH

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American Heart Association. Med Sci Sports Exerc. 2007;39(8):1423–34. Available from: https://doi.org/10.1249/mss.0b013e3180616b27

22. Slišković A, Penezić Z. Lifestyle factors in Croatian seafarers as relating to health and stress on board. Work Read Mass. 2017;56(3):371–80. Available from: https://doi.org/10.3233/WOR-172501

23. Biswas T, Tran N, Thi My Hanh H, Van Hien P, Thi Thu Cuc N, Hong Van P, et al. Type 2 diabetes and hypertension in Vietnam: a systematic review and meta-analysis of studies between 2000 and 2020. BMJ Open. 2022;12(8):e052725. Available from: https://doi.org/10.1136/bmjopen-2021-052725

24. Miyakawa M, Shimizu T, Van Dat N, Thanh P, Thuy PTP, Anh NTH, et al. Prevalence, perception and factors associated with diabetes mellitus among the adult population in central Vietnam: a population-based, cross-sectional seroepidemiological survey. BMC Public Health. 2017;17(1):298. Available from: https://doi.org/10.1186/s12889-017-4208-9

25. Nguyen VD, Vien QM, Do TH, Phan CD, Nguyen HC, Nguyen VT, et al. Prevalence of undiagnosed diabetes and pre-diabetes and its associated risk factors in Vietnam. J Glob Health Sci. 2019;1(1):e7. Available from: https://doi.org/10.35500/jghs.2019.1.e7

26. Galicia-Garcia U, Benito-Vicente A, Jebari S, Larrea-Sebal A, Siddiqi H, Uribe KB, et al. Pathophysiology of Type 2 Diabetes Mellitus.Int J Mol Sci. 2020;21(17):6275. Available from: https://doi.org/10.3390/ijms21176275

27. Ormazabal V, Nair S, Elfeky O, Aguayo C, Salomon C, Zuñiga FA. Association between insulin resistance and the development of cardiovascular disease. Cardiovasc Diabetol. 2018;17(1):122. Available from: https://doi.org/10.1186/s12933-018-0762-4

28. Chen SY, Wang T, Hou XH, Qian Y, Zhang HD, Lu QL, et al. Prevalence and risk factors of diabetes and prediabetes in adults in Jingyuan Ningxia]. Zhonghua Nei Ke Za Zhi. 2018;57(7):500–4. Available from: https://pubmed.ncbi.nlm.nih.gov/29996268/

29. Scott R, Langenberg C, Sharp S, Franks P, Rolandsson O, Drogan D, et al. The link between Family History and risk of Type 2 Diabetes is Not Explained by Anthropometric, Lifestyle or Genetic Risk Factors: the EPIC-InterAct Study. Diabetologia. 2013;56:60-9. Available from: https://doi.org/10.1007/s00125-012-2715-x

30. Uehara A, Kurotani K, Kochi T, Kuwahara K, Eguchi M, Imai T, et al. Prevalence of diabetes and pre-diabetes among workers: Japan Epidemiology Collaboration on Occupational Health Study. Diabetes Res Clin Pract. 2014;106(1):118–27. Available from: https://doi.org/10.1016/j.diabres.2014.07.013

31. Quynh CTT, Van TN, Viet DNH, Thi PD. Prevalence of and factors related to diabetes among aquaculture workers in Hai Phong, Vietnam: a cross-sectional study. J Public Health Dev.2024;22(2):131–44. Available from: https://doi.org/10.55131/jphd/2024/220211

32. Shi L, Shu XO, Li H, Cai H, Liu Q, Zheng W, et al. Physical activity, smoking, and alcohol consumption in association with incidence of type 2 diabetes among middle-aged and elderly Chinese men. PloS One. 2013;8(11):e77919. Available from: https://doi.org/10.1371/journal.pone.0077919

33. Jurisić-Erzen D, Benko K, Ljubić S, Jerković R. The prevalence of depression and anxiety in seafarers type 2 diabetic patients. Coll Antropol. 2011;35(4):1067–70. Available from: https://hrcak.srce.hr/file/112331

34. Holt RIG, de Groot M, Golden SH. Diabetes and depression. Curr Diab Rep. 2014;14(6):491. Available from: https://doi.org/10.1007/s11892-014-0491-3

Int. J. Occup. Safety Health, Volume 15, No 4 (2025), 370-379

https://www.nepjol.info/index.php/IJOSH

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