

# Cardiovascular risk factors among 3712 Greek seafarers

Marios Papadakis<sup>1</sup>, Andreas Afendras<sup>2</sup>, Charalampos Skiadas<sup>3</sup>, Despoina Renieri<sup>3</sup>,  
Morfo Tsaknaki<sup>4</sup>, Ioannis Filippopoulos<sup>5</sup>, Chrysoula Liakou<sup>2</sup>

<sup>1</sup>University Witten-Herdecke, Wuppertal, Germany

<sup>2</sup>Fleet Medical Advisor, Angelicoussis Group Shipping Limited, Greece

<sup>3</sup>Information Technology Department, Angelicoussis Shipping Group Limited, Greece

<sup>4</sup>Vioklini General Hospital, Athens, Greece

<sup>5</sup>Hellenic American University, Greece

## ABSTRACT

**Background:** Global concern on seafarers' health and its potential cost is widely evident across the shipping industry. Seafarers are at increased cardiovascular risk since it is common to have risk factors associated with that risk such as hyperlipidaemia, obesity and smoking. The aim of this study is to assess the prevalence of the main risk factors for cardiovascular disease (CVD), i.e. hyperlipidaemia, smoking and obesity, in Greek seafarers.

**Materials and methods:** During pre-embarkation medical examination, seafarers undergo an interview with a physician, physical examination and laboratory tests. The parameters studied included hyperlipidaemia, identified as low density lipoprotein > 150 mg/dL, tobacco use or severe obesity, as defined by body mass index > 35 kg/m<sup>2</sup>.

**Results:** A total of 3712 seafarers have been examined. Seafarers had overall rates of 3% hyperlipidaemia, 4% tobacco use and 0.2% severe obesity, with similar distributions in all age groups. Our study shows that Greek seafarers have lower risk for CVD, as low rates of obesity, tobacco use, and hyperlipidaemia are observed. The related literature is discussed. Unhealthy eating patterns are the rule and contribute to CVD. Shipping management could improve diet on board; however, smoking falls rather under individual control.

**Conclusions:** We conclude that, despite the low rates of hyperlipidaemia, smoking and obesity among Greek seafarers compared to other nations, campaigns for promoting awareness of the phenomenon and on the potential health impact of these conditions should be promoted.

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**Key words:** seafarers, Greek, cardiovascular risk, obesity, hyperlipidaemia, smoking

## INTRODUCTION

It is estimated that 90% of global commerce relies on water transportation. There are approximately 1.5 million seafarers worldwide (ocean-going). They can be considered labour migrants, moving from port to port and contract to contract. Seafarers are mostly from developing nations and are an aging workforce. They are an isolated workforce with unique health risks and limited access to medical care. Maritime regulators, ship owners, trade unions and P&I clubs are all alert to the fact that seafarers face multiple challenges, therefore their health and wellness should be at its top tier.

All seafarers are obliged to undergo biennial pre-embarkation medical examination to ensure their fitness for duty. For many seafarers, this examination, represents the only contact with a physician [1], and, therefore, the only chance for underlying disease to be detected and treated. Seafarers with common diseases such as hyperlipidaemia, obesity and smoking may have reduced performance, which could lead to environmental damage, ill-health and reduced lifespan among highly skilled seafarers, who are in increasingly short supply. Seafarers are at increased risk of myocardial infarction; and cardiovascular disease

✉ Marios Papadakis, MD, PhD, University Witten-Herdecke, Germany, e-mail: marios\_papadakis@yahoo.gr

**Table 1.** Overall and age group analysis of the prevalence of hyperlipidaemia, tobacco use and obesity in Greek seafarers, expressed in terms of absolute (n) and relative (%) frequencies

Age group	Total subjects	Hyperlipidaemia	Smoking	Obesity
Overall	3712	105 (3%)	140 (4%)	7 (0.2%)
20–30 years	1626	26 (2%)	72 (4%)	2 (0.1%)
30–40 years	1051	38 (4%)	43 (4%)	3 (0.3%)
40–50 years	476	26 (5%)	21 (5%)	0 (0%)
50–60 years	211	15 (7%)	4 (2%)	2 (1%)

(CVD) accounts for more than 18% of all naval disability causes [2].

Although there is literature regarding cardiovascular risk factors among European sailors [3], Greek seafarers have not been studied. The aim of this study is to assess the prevalence of the main risk factors for CVD [3], i.e. hyperlipidaemia, smoking and obesity, in Greek seafarers.

## MATERIALS AND METHODS

### MEASUREMENTS PARAMETERS

A computer-based prospective database was developed, where Fleet Medical Advisor records all medical information. During pre-embarkation medical examination, seafarers undergo an interview with the doctors, physical examination and laboratory tests. All results are recorded in the database. The parameters studied included hyperlipidaemia, identified as low density lipoprotein (LDL) > 150 mg/dL, tobacco use or severe obesity, as defined by body mass index (BMI) > 35 kg/m<sup>2</sup>. The data of nationality, age, weight, height, blood glucose and blood pressure values obtained from 3712 seafarers in a 4-year period were analysed. Body mass index values were calculated.

### STATISTICAL ANALYSIS

Data normality was determined with histograms, Q-Q plots and the Shapiro test. Continuous data with a normal distribution is presented in mean-deviation form. Non-normal distributed variables are presented with medians and ranges. Data analyses were performed using SPSS version 17.0.

## RESULTS

A total of 3712 seafarers have been seen. All seafarers examined were males, aged between 21 and 60 years (median 31 years). Seafarers had overall rates of 3% hyperlipidaemia, 4% tobacco use and 0.2% severe obesity. In the age group 20–30, 2% of the seafarers had hyperlipidaemia, 4% used tobacco and 0.1% were severely obese. In the age group 30–40, 4% of the seafarers presented with hyperlipidaemia, 4% used tobacco and 0.3% suffered from severe obesity. In the age group 40–50, 5% had hyperlipidaemia,

5% were smokers but no obese seafarers were observed. Seafarers between 50 and 60 years of age demonstrated higher prevalence of hyperlipidaemia and lower smoking rates than the other groups (7% and 2%, respectively), the difference not being statistically significant. All data presented is summarised in Table 1.

## DISCUSSION

Our study showed that Greek seafarers are not at increased risk of CVD, as low rates of obesity, tobacco use and hyperlipidaemia were observed.

Smoking is a well-defined risk factor for chronic heart disease among seafarers. High smoking prevalence among seafarers is attributed to work-related stress and lack of leisure time facilities [4]. Our study demonstrates a low prevalence of smoking among Greek seafarers, compared to seafarers sailing under other flags. In a literature review smoking prevalence among mariners varied between 37.3% and 72.3% [3]. Slišković et al. [5] report 42% of 507 Croatian seafarers being smokers.

One possible explanation for the low number of smokers among Greek seafarers, given the high prevalence of smoking in the general population, could be that smoking habits are more common on board and our seafarers were interviewed during pre-embarkation. Seafarers that work for months on tankers, followed by vacations after disembarkation, which can last up to several months. Such seafarers are more possible to experience different-life-styles [6] with smoking sessions on board followed by non-smoking periods and are the majority of our sample. Higher smoking levels on board (18%) than at home (12.5%) have indeed been observed in case of heavy smokers, i.e. more than 20 cigarettes per day [5]. Our finding is in line with the general decrease in smoking rates observed in the subpopulation of seafarers during the last decades, e.g. 2000s compared to 1990s [3].

We also found 4% overall obesity rate, significantly lower to the rates reported. The next lower obesity rate is reported for Italian seafarers (10%), but rates > 30% are common in the literature. However, the difference might be explained from the fact that the threshold defining obesity

differs between the studies. Some authors consider obesity BMI > 30 kg/m<sup>2</sup> [6–8], others (e.g. the current work) study severe obesity setting the threshold at BMI > 35 kg/m<sup>2</sup>, whereas others group together overweight and obese seafarers, i.e. BMI > 25 kg/m<sup>2</sup> [1]. Older age is associated with increase in obesity [6]. Turkish male seafarers begin to gain excessive weight from the age of 28, reaching the highest BMI value at their 50s [8], while Italian male seafarers gain excessive weight between 39 and 45 years and reach the highest BMI in the group of 55–66 years of age [9].

An overall of 3% of our sample demonstrated hyperlipidaemia, defined as high LDL cholesterol levels. This is a low percentage compared to the existing studies. Oldenburg et al. [4] report high LDL cholesterol levels in 18% of German seafarers. According to a literature review for mariners, 25–42% of the populations studied, suffered from hypercholesterolaemia [3].

Unhealthy eating patterns are the rule and contribute to CVD. It is known for example that overeating as well as consuming sweets, cake and sugared sodas are more frequent on board than at home [7]. About 80% of the mariners are not satisfied with the quality of food available on board. Twenty per cent of them consume dietary supplements to overcome dietary gaps [9]. Several other barriers to a healthy diet have been described, including easily accessed duty-free tobacco and sugared products available on-board, not adequately trained cooks [6], financial difficulties together with stress- and boredom-related factors [7]. Shipping management could improve diet on board; however, smoking falls rather under individual control [5]. Our low rates might, thus, be explained as the result of interventions implemented to improve seafarers' health the last 2 years (diet centralisation, introduction of low-fat diets, prevention of overeating, cooking classes with experts for the ship cooks' etc.).

Physical activity during leisure time is also very important with variations among individuals. Danish seafarers claimed to do fitness training 3 times a week or more; more often on board than at home (32% vs. only 24%) [7]. However, only 30% were classified as having high physical fitness during testing, with one-third demonstrating low physical fitness [7]. Twenty per cent of the seafarers are completely inactive, the main reasons being lack of motivation due to poor weather conditions at sea or lack of time [7].

Our study has several limitations. Firstly, the job duration has not been recorded. Secondly, other dependent and independent chronic heart disease risk factors (e.g. hypertension, diabetes, positive family history, alcohol) have not been studied, which may underestimate the cardiovascular risk. Thirdly, seafarers are a working population and it is possible that our outcomes reflect a healthy worker effect. Fourthly, the analysis was based on seafarers' data from a 4-year period. A larger database could deliver more reliable results [8].

## CONCLUSIONS

We conclude that, despite the low rates of hyperlipidaemia, smoking and obesity among Greek seafarers compared to other nations, campaigns for promoting awareness of the phenomenon and on the potential health impact of these conditions should be promoted.

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