

A research on obesity among Turkish seafarers

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ABSTRACT

Background: Obesity and overweight threaten not only seafarer's health but also the safety of operations on board a ship. The aim of the study was to investigate the statistical distribution of obesity and overweight among Turkish seafarers by using the health examination reports data collected between 2009 and 2012.

Materials and methods: The data on weight, height and age obtained from 143,341 medical examination reports of Turkish seafarers were used with the official permission of Directorate General of Health for Border and Coastal Areas. Considering the data in the health reports, body mass index (BMI) values were calculated, analysed and compared with Turkish general population and Danish seafarers.

Results: It has been found that BMI values of Turkish seafarers were boomed over the years. While Turkish male seafarers get older, their BMI values rise progressively. After the age of 28, BMI scores exceed the acceptable level. In addition, they reach maximum average 27.8 BMI value in their 50s.

Conclusions: The activities, which will provide awareness to Turkish seafarers and the ship operators about the dangers of obesity, should be done. Also convenient environments and time for physical exercise on board a ship must be provided for seafarers.

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Key words: obesity, body mass index, Turkish seafarers

INTRODUCTION

In many parts of the world, obesity and overweight has become a major health problem. As a result of being obese and overweight, at least 2.8 million adults die each year [1]. The main impact of obesity on health is cardiovascular disorders [2].

The definitions of obesity and overweight are similar in general terms. According to World Health Organisation (WHO), obesity and overweight is defined as abnormal and excessive fat accumulation that presents a risk to health [3]. Health and Social Care Foundation (Turkey) defines obesity as the increase of body fat [4, 5].

The review of literature reports on obesity showed that obesity is a very important risk factor for some types of diseases, but it is considered as modifiable risk factor [6–10]. Besides its influence on health, overweight and obesity might pose a safety problem on board at sea. It might be difficult for overweight people to carry out safety tasks

abroad in emergencies, to make use of escape routes and ladders and to step in a lifeboat or a life raft. This is significant issue not only for the overweight people but also for those being subject to their actions or engaged in assisting them [11]. In this context, the study made by Roberts et al. [12] shows that fatal accident and injury rates in shipping industry are higher than in construction industry and manufacturing industry. This shows that, due to the more risky working condition, seafarers are required to be fit in order to withstand risky situations. On the other hand, other study made by Bridger and Bennett [13] indicates that body mass index (BMI) and age has been associated with work ability and effect of high BMI on work ability is stronger.

A WHO report “Consultation an Obesity” published in 1997 [14] for the first time presented consistent system for classifying overweight and obesity. Then, it has been adopted internationally [15]. The consistent system was designated as BMI. The weight in kilograms divided by the



Table 1. Classification of overweight according to body mass index (BMI) [Resource: WHO, 1997: 9]

Classification	BMI	Risk of co-morbidities
Underweight	< 18.5	Low
Normal range	18.5–24.9	Average
Overweight	25–29.9	Increased
Obesity class I	30.0–34.9	Moderate
Obesity class II	35.0–39.9	Severe
Obesity class III	≥ 40.0	Very severe

square of the height in meters brings out BMI. The relevant formula is shown below.

$$\text{BMI} = \frac{\text{Weight}}{(\text{Height})^2}$$

The WHO classification of overweight and obesity, according to BMI, is shown in Table 1.

In Turkey, the most reliable and recent obesity research was carried out by Turkish Statistical Institute (TSI) [16]. In this research, 14,400 houses were screened for general health status, chronic diseases, height and weight of the Turkish people aged 15 years and over. Considering the result of the TSI [16] study, 39% of men in Turkish population were overweight and 14% were obese, as shown in the Table 2.

When reviewing the literature, a few studies related to obesity among seafarers were spotted. One of them was about life style, nutritional status and working conditions of Danish sailors [17]. The main objectives of the study were to reveal nutritional status and working conditions of Danish sailors. 390 sailors participated in the survey. The results of the study revealed that 22% of Danish sailors between 55 and 64 years of age were obese. The other study was about obesity among Danish seafarers [11]. The objectives of the study were to investigate the prevalence of overweight among male seafarers and to determine the potential consequences of adopting maximum allowable BMI for seafarers. Among 1,257 male Danish seafarers, 1% between 45 and 66 years of age had weight below normal, 23% had normal weight and 77% had weight above normal, while 31% of this age group were obese. Another study related to obesity and nutritional status was about extent of the problem of overweight among Danish fishermen and seafarers [18]. According to this study, 33% of Danish seafarers between

45 and 64 years of age were obese. It has been found, based on body mass indices between studies surveyed in 1994, 2005 and 2011, that there was a statistically significant increase in the number of overweight and obese merchant seafarers over the years.

Obesity problem in Turkish maritime education was examined for the first time by Nas and ve Oksayan [19]. The study was carried out on students of Dokuz Eylül University Maritime Faculty. In this study, it has been found that students' weight and height has increased during 5-year undergraduate education. The BMI value of the students increased by 1.83 BMI units in 5-year education period. At the time of graduation average BMI reached the value of 24.3. There are weight and height requirements for admission to maritime schools in Turkey. Dokuz Eylül University, Maritime Faculty, İzmir was the first to regulate the admission requirements according to BMI in 2013. The faculty identified 19–30 BMI range as a condition of accepting students [20].

On the other hand, in Turkey there is not any study that examined obesity and overweight among Turkish seafarers. For this reason, the aim of this study has been determined as to specify the prevalence of overweight and obesity among Turkish seafarers. Other objectives of the study are to reveal the height, weight and BMI values of Turkish male seafarers and compare BMI values of Turkish seafarers with that of Turkish general population and Danish seafarers.

MATERIALS AND METHODS

The study is based on measurements made as a part of medical examination that should be taken every 2 years by Turkish seafarers. The medical examination reports contain data on seafarers' age, height, and weight. The data officially requested are recorded on to Republic of Turkey Ministry of Health Directorate General of Health for Border and Coastal Areas' information management system. In this study, the medical data, obtained from 143,341 medical examination reports of Turkish seafarers were analysed. The data obtained were analysed by statistical program SPSS.20. Due to the fact that medical examination is conducted and renewed every 2 years; the data include more than one measurement data that belong to the same seafarers. Similar to this study, medical examination reports obtained by U.K. Atomic Energy Authority were also analysed by Howell [21] to reveal height, weight and BMI values of employees

Table 2. Distribution of body mass index (BMI) by gender in Turkish population [Resource: TSI, 2013]

Turkish people Age ≥ 15	BMI < 18.5	BMI 18.5–25.0	BMI 25–30	BMI ≥ 30
	Underweight	Normal weight	Overweight	Obese
Male	2.7%	44.7%	39.0%	13.7%
Female	5.1%	43.6%	30.4%	20.9%
All	3.9%	44.2%	34.8%	17.2%

working in this industry. This study provided us with some insight into the problem of obesity among seafarers.

RESULTS

In this study, data of 143,341 medical examination reports were analysed. The distribution of the reports and the gender of seafarers by years are shown in Table 3. Rate of woman seafarers among the Turkish seafarers is only 3%. As shown in Table 3, each year approximately 35,000 seamen have received a medical examination report and the data was obtained from this reports.

When obtained data concerning age, weight, height and BMI values were analysed according to gender, statistically significant ($p < 0.000$) differences were detected. The average age of women seafarers was 26.79, while that of men was 33.31; the average body weight of women seafarers was 61.01 kg, while that of men was 77.48 kg; the average height of women was 165.6 cm, while that of men was 174.4 cm. BMI of women was 22.16, while that of men was 25.34.

In order to compare these data with former studies on seafarers relevant to the subject, the BMI classification of Hoeyer and Hansen [11] was adopted as a reference, instead of WHO classification. Also, analysed data were collocated by considering the study of Hansen et al. [18], due to more recent data. In addition, only male seafarers were included in the analysis to make a comparison with related study. Classification of Hoeyer and Hansen [11] is stated below:

- BMI < 20.0: Below normal weight
- 20.0 ≤ BMI < 25.0: Normal weight
- 25.0 ≤ BMI < 30.0: Moderate overweight
- BMI ≥ 30.0: Obesity

The comparisons of the results of this study with former studies on seafarers are shown in Table 4. Turkish male seafarers were divided into following age groups: 16–24, 25–44 and 45–66 years. As a result, 23% of Turkish male seafarers in 16–24 age group, 44% of Turkish male seafarers in 25–44 age group and 52% of Turkish male seafarers in 45–66 age group were found to be overweight. The rate of

Table 3. Distribution of the number of seafarer by year and gender

Years	Gender of seafarers		Total
	Male	Female	
2009	31,602	956	32,558
2010	34,770	868	35,638
2011	36,392	1,051	37,443
2012	36,566	1,136	37,702
Total	139,330	4,011	143,341

obesity among Turkish male seafarers in 45–66 age group was determined as 23%.

The study has investigated whether there is significant difference between height, weight and BMI values of Turkish male seafarers by years and whether there is significant relationship between these BMI values and years. For this purpose, correlation and analysis of variance (ANOVA) tests were performed. According to analysis results, the average weight and average ages of Turkish male seafarers were correlated ($r = 0.028$, $p \leq 0.000$). Moreover, the average height values and average ages of Turkish male seafarers were correlated ($r = 0.025$, $p \leq 0.000$). Also, it has been found that the BMI values and averages ages of Turkish male seafarers were correlated ($r = 0.017$, $p \leq 0.000$).

According to the results of the ANOVA tests, the average values of height, weight and BMI by years are shown in Table 5.

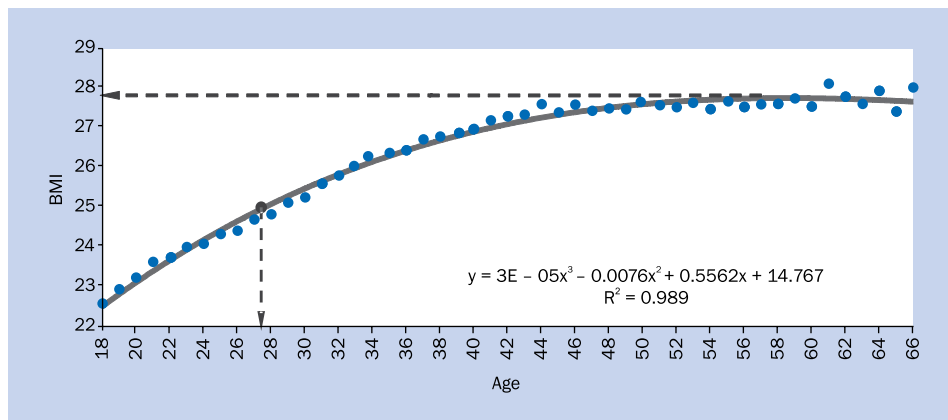
According to the results of the ANOVA tests, the average values of height, weight and BMI by years are shown in Table 5. The results of ANOVA revealed that there is significant difference between the years of health examination reports and average weight values ($F(3-139006) = 38.303$, $p \leq 0.000$). Moreover, there is significant difference between average values of BMI and the years of health examination reports ($F(3-138606) = 17.201$, $p \leq 0.000$). The study has investigated whether there is significant relationship between age of Turkish male seafarers and average weight and BMI values. The regression analysis diagram of average BMI and ages values is shown in Figure 1.

Table 4. Distribution of male Turkish seafarers according to age and body mass index (BMI) groups [*TUIK, 2012]

Turkish male seafarers (n = 131,152)	BMI < 25.0	BMI 25–30	BMI ≥ 30	Number of participants
16–24 age group	74.1%	22.5%	3.4%	34,421
25–44 age group	44.1%	43.3%	12.6%	68,038
45–66 age group	25.6%	51.1%	23.4%	28,693
All Turkish male seafarers	47.9%	39.6%	12.5%	131,152
Turkish male population*	47.3%	39.0%	13.7%	–

Table 5. The analysis of variance (ANOVA) results of the Turkish male seafarers' average height, weight and body mass index (BMI) values by years

Year	Weight [kg]			Height [cm]			BMI		
	Mean	SD	N	Mean	SD	N	Mean	SD	N
2009	77.02	12.9516	31,524	174.49	6.9123	31,431	25.269	3.8978	31,386
2010	77.16	13.1900	34,687	174.64	6.9467	34,625	25.264	3.9468	34,545
2011	77.76	13.5081	36,307	174.75	6.9259	36,315	25.421	4.0222	36,236
2012	77.93	13.5684	36,492	174.97	6.8806	36,514	25.418	4.0307	36,443

**Figure 1.** Regression curve of relationship between body mass index (BMI) and age

According to the analysis results, while Turkish male seafarers get older, their average weight values rise progressively and on average at the age of 44 years they reach a maximum of 82 kg. Likewise, while Turkish male seafarers get older, their BMI values rise progressively. Moreover, it has been found that they reach 25 BMI value, limit of overweight, at the age of 28 years, approximately. In addition, they reach maximum average 27.8 BMI value at the age of 50 years.

DISCUSSION

This study is the first study showing the problem of excessive weight of Turkish seafarers. Also, the study shows that Turkish male seafarers began to gain excessive weight from the age of almost 28, and they reach the highest level of BMI value at their 50s.

Comparison of data on excessive weight among Turkish seafarers with results of other studies conducted in Turkish population showed undesirable pattern. The results of Health Survey Report 2013 presented by TSI [16] show that only 39% of Turkish men were found to be overweight. In this study 39.6% of Turkish male seafarers were found to be overweight, but rate of obesity among men in Turkish general population is higher than among Turkish male seafarers.

When compared the results to the study conducted by Hansen et al. [18], overweight percentage of Turkish male seafarers was higher than Danish male seafarers, according to BMI in all age groups. The prevalence of obesity among the Turkish male seafarers has been found to be at undesirable level. The obesity rate in Turkish seafarers between the age of 25–44 and 45–66 is higher than among Danish seafarers (3% and 8%, respectively). Consequently, the percentage of obese and overweight Turkish male seafarers is higher than that of Danish male seafarers.

The limitation of the study is that the analysis includes only 4-year statistical data. It is believed that observation longer than 4 years gives more reliable results. Besides, the data used in this study was limited in terms of variable groups. A comparative evaluation can be done in terms of department, rank and sea experience as a further research. Additionally, it is proposed to investigate the effect of obesity on health and accident rate the on board a ship.

CONCLUSIONS

These results have shown that the activities which will provide awareness to Turkish seafarers and the ship operators about the dangers of obesity should be done. Also, convenient environments and time for physical exercise on board a ship must be provided for seafarers. In addition,

eating habits, quality of food and health status of seafarers must be monitored on board a ship.

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