

## Some occupational health hazards among fishermen in Alexandria city

İskenderiye şehrindeki balıkçılar arasında bazı mesleki sağlık tehlikeleri

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### Abstract

Where the fisherman's nature of work consumes much of his time and energy, and this is incompatible with normal family life. The work environment is uncomfortable in most cases, especially with the length of work periods at sea on the surface of the compound as well as isolation for long periods of time away from the external environment. Also, many of them suffer from instability therefore since 1713 fishing has been noted as an occupation with a high risk of occupational hazards. There are many problems that can be taken into account when studying occupational health problems for fishermen. Main problems that have been observed: accidents and injuries, musculoskeletal problems, stress, hearing problems caused by noise and skin burns, so the provision of occupational health services for this category is an urgent need which should be available. Cross-sectional study was conducted on a sample of 124 fishermen who work in Alexandria city, and a control group of other comparable consisting of 130 salesmen working in the same city. Previously prepared questionnaire was conducted on all participants in the search for data collection and the work of an environmental assessment to measure the noise level in the work environment. This study showed a statistically significant difference between the fishermen and control group in different health problems ( $P<0.001$ ). The results of study also found that the most common causes of accidents among hunters are falling from the top deck (71.0 %), and injury during transport and handling equipment (44.0%), and trading of fish (26.4%). This study has shown that most of the fishermen (62.9%) suffering from nervous high pressure. With regard to noise induced hearing loss, the results of the current study showed that only a small percentage of fishermen are suffering from hearing loss. The results of this study showed that the majority of fishermen complained of sunburned at different intensity from mild to moderate (51.6 % and 19.4%, respectively). As for the results of the environmental assessment conducted during this study showed that the average noise in the engine room large vessels (greater than 150 horsepower) was 113 dB, and the average hours of work hunter inside this room were an hour and a half, while on board of ships, the average readings 77.55 dB and the average working hours of fishermen on these ships almost 13 hours. Either on the surface of vessels of small (less than 150 horsepower) where no separate room for the engine, the average noise level was 90.83 dB and average working hours was 9 hours and 53 minutes, but if there is no follow-up the engine regularly and maintain the quality of work, the noise level became 105 dB approximately. From this study, it can be concluded that the fishermen in the Alexandria city are exposed to many occupational health hazards that lead to many diseases and disabilities.

**Keywords:** Alexandria; fishermen; health hazards

### Özet

Balıkçıların işi gereği enerji ve zamanının çoğunu harcarlar ve bu normal aile yaşamı ile uyumlu değildir. Çalışma ortamı pek çok durumda, özellikle dış ortamdan uzakta uzun zaman izolasyonun yanı sıra deniz yüzeyindeki bölgede uzun zaman periyotları ile rahatsız edicidir. Balıkçıların çoğu dengesizlikten de muzdariptir ve bundan dolayı 1713'den beri balıkçılık yüksek riskli mesleki tehlikeleri olan meslek olarak kabul edilmiştir. Balıkçılar için mesleki sağlık problemleri araştırıldığı zaman dikkate alınabilecek birçok problemler vardır. Gözlenen başlıca problemler: kazalar ve yaralanmalar, kas-iskelet problemleri, stres, gürültüden kaynaklanan işitme problemleri ve deri yanıklarıdır, bundan dolayı bu kategori için mesleki sağlık hizmetlerinin sağlanması olması gereken acil bir ihtiyaçtır. İskenderiye şehrinde çalışan 124 balıkçı ve aynı şehirde çalışan 130 satıcıdan oluşan karşılaştırılabilir kontrol grubunda kesitsel bir çalışma yapıldı. İş ortamındaki gürültü düzeyini ölçmek için ortam araştırması çalışması ve veri toplama için çalışmadaki bütün katılımcılara daha önceden hazırlanan anket uygulandı. Bu çalışma farklı sağlık problemlerinde balıkçılar ile kontrol grubu arasında istatistiksel olarak anlamlı farklılık gösterdi ( $P<0.001$ ). Çalışmanın sonuçları avcılar arasında kazaların en yaygın nedenlerinin üst güverteden düşme (%71.0), aleti tutma ve taşıma sırasında yaralanma (%44.0), ve balık alışverişi (%26.4) olduğunu da buldu. Bu çalışma birçok balıkçının (%62.9) sinirsel yüksek tansiyondan muzdarip olduğunu gösterdi. Gürültünün indüklediği işitme kaybı ile ilgili olarak, mevcut çalışmanın sonuçları balıkçıların sadece küçük bir yüzdesinin işitme kaybı çektiğini gösterdi. Bu çalışmanın sonuçları balıkçıların çoğunluğunun hafiften (%51.6) orta dereceye (%19.4) farklı şiddette güneş yanığından yakındığını gösterdi. Bu çalışma sırasında yapılan çevre değerlendirmesi sonuçları büyük gemilerin (150 beygir gücünden yüksek) motor odasında ortalama gürültünün 113 dB ve bu odadaki ortalama avlanma saatinin 1.5 saat olduğunu, gemi bordasında ortalama okumanın 77.55 dB ve balıkçıların ortalama çalışma



saatinin yaklaşık 13 saat olduğunu gösterdi. Motor için ayrı bir oda olmayan küçük teknelerin (150 beygir gücünden düşük) yüzeyinde ortalama gürültü düzeyi 90.83 dB ve ortalama çalışma saati 9 saat 53 dakikaydı. Fakat eğer düzenli motor bakımı yapılmadığı ve çalışma kalitesi sürdürülmediğinde, gürültü düzeyi yaklaşık 105 dB oluyordu. Bu çalışmadan İskenderiye şehrindeki balıkçıların birçok hastalık ve özürlere yol açacak mesleki sağlık tehlikelerine maruz kaldıkları sonucu çıkarılabilir.

**Anahtar kelimeler:** İskenderiye; balıkçılar, sağlık tehlikeleri

### Introduction

Fishing is one of the world's oldest occupations (1). Fishing is probably the most dangerous occupation in the world (2) and since 1713 fishing has been noted as an occupation with a high risk of occupational hazards especially traumatic injury (3). Although the physically taxing nature of commercial fishing is recognized, understanding the occupational health and safety challenges for these traditional workers is difficult. They work in the wild in non-industrial settings, their work is non-routine or in very long cycles, and is dictated by factors that do not influence most industrial workers such as weather, crew and boat sizes, and fishery policies (4). Several studies conducted in North Carolina (5), Turkey (6) and Norway (7) revealed that fishermen exhausting their loco-motor system during their work; so it is highly possible for them to have musculoskeletal system complaints.

The role of a fisherman is demanding in terms of both time and energy. Their working environment can be uncomfortable at many times. They have to stay for long trips at sea on the board of the vessel staying at open air, also have to cooperate with his crew even if there is bad relationship between them, thus making the job of a fisherman more difficult. Other factors that could impair safety in this workforce include isolated locations, long working hours, and days with little rest. Furthermore, they are exposed to high demands in their work, which may conflict with a normal family life. These factors may increase the risk of stress-related symptoms in fishermen (3). The deck of a fishing vessel is a congested work area, crowded with fishing gear and equipment, and is constantly moving. The National Research Council noted "the apparent high incidence of workplace accidents suggests inadequately designed safety features in machinery, deck layouts, and fishing gear" (8). In 2002, commercial fishermen had the second highest traumatic injury fatality rate of all workers in the United States. Also, many commercial fishermen endure fatigue, physical stress, and financial pressures to push their vessels and crew to make their livings (9).

Exposure to some physical hazards considered another source of adverse health effects, like exposure to loud machinery noise in the engine room which is common on board fishing vessels, exposure to changes in environmental conditions especially

extremes of temperature and humidity. The risk of skin and eye damage due to sun exposure is greater at sea than on land because of the unhindered reflection of the sunlight (8).

Frequent and prolonged contact with sea water, which is associated with continuous wetness and potential hazards of marine creature, and contact with the equipment used in the marine work all may be hazardous to the skin as they can cause for example contact dermatitis and traumatic injuries which can be a portal of entry for various infectious agents (10). In Egypt, there are about 210,000 fishermen and around two million people work in the fishing and fish processing industry, many fishermen have either left their jobs altogether or migrated due to lack of workers' rights and bad working conditions (11). This work is aimed to promote the different health aspects of fishermen. The objectives of this study were to identify some of occupational health problems affecting fishermen in Alexandria city due to exposure to hazards in their work, and to assess some of the occupational and personal risk factors that may be associated with these health problems.

### Methods

#### Study design and setting

A comparative cross-sectional study was carried out during the period from January to March 2011 at El-Anfoshy Coast in Alexandria City.

#### Target population (Subjects)

The target population includes two groups of workers:

**Fishermen (exposed group):** It includes 124 fishermen exposed to different hazards associated with their work; this group includes in-shore and offshore fishermen.

**Controls (non-exposed group):** It includes 130 sellers worked in Alexandria City in covered area and not exposed to same hazards at their current occupation nor even had a past history of exposure.

Both groups were male workers and comparable as regards age, socio-economic status and level of education.

#### Sampling technique

The sample size:

The sample size was calculated through Epi-Info software version 6.1.

**Inclusion criteria:** Fishermen who assigned

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permanent work and worked for duration not less than one year were taken in the study.

**Exclusion criteria:**

Fishermen with past history of MSDs before joining the work or due to accidents occurring outside work. Family history of hearing loss before age of 50 years. Past history of ear infections or previous ear surgery.

**Exclusion criteria for control group:**

Who was not comparable with the fishermen in age, educational level, income and duration of work. Who had past history of MSDs, ear infections or previous ear surgery.

**Sample selection:**

All fishermen in Alexandria City are working at two coasts, El- Anfoshy and Abukir (Department of Fisheries and Agricultural Research), where El-Anfoshy Coast was randomly selected. Systematic random technique is used to select fishermen in this study, where we took one every five fishermen and the first is selected randomly from the first five fishermen.

**Data collection (methods):**

1. A pre-designed questionnaire was used to collect information from all participants. It includes several parts:

**Part one** includes questions about personal and socio demographic data.

**Part two** includes questions about occupational history.

**Part three** includes questions about past and family history.

**Part four** includes questions about musculoskeletal complaints by using Nordic Musculoskeletal Questionnaire (NMQ) proposed by Kuorinka et al. (12) which ask about the presence of ache, pain, discomfort or numbness during last 12 month and during last 7 days and effect of these symptoms on normal daily activities during last 12 month in any of the following body parts: neck, shoulder (right, left or both), elbow (right, left or both), wrists and hands (right, left or both), upper back, lower back, hip or buttocks (one or both), knee (one or both) and ankle and foot (one or both).

**Part five** includes questions about stress by using National Stress Awareness Day (NSAD) questionnaire proposed by British International Stress Management Association (13). It includes 24 questions answered by yes or no to assess stress level.

**Part six** includes questions about different types of accidents, its causes and injuries related to it using questionnaire proposed by Jensen et al. (14).

**Part seven** includes questions about auditory complaints by using audiometric questionnaire proposed by Oregon State University Environmental Health and Safety Department (15).

**Part eight** includes questions about complaints from sunburn and its degree proposed by Corona et al. (16).

The questionnaires were in Arabic language to insure that the interviewer will be stimulated in the same way.

2. *Environmental assessment* to assess noise level in the working environment by using sound level meter (digital instrument No.407740), where the noise level measured in engine room of large vessels >150 HP (Horse Power), and on board of small boats ≤ 150 HP.

*Ethical considerations:* Ethical considerations were respected. A informed consent was obtained from all participants of this study. The workers were told about the aim of the study, and they were informed that the data would be used for scientific purposes only. The workers were also given the right to refuse or participate in the study.

*Constraints of the study:*

1- Some fishermen refused to cooperate despite sufficient explanations.

2- There were some hesitations of the fishermen to admit having symptoms for fear of being lost their work.

*Statistical methods*

The collected data were computerized and statistically analyzed using SPSS program (Statistical Package for Social Science) version 14.0. Qualitative data were represented as frequencies and relative percentages and Chi-square test was used to calculate difference between qualitative variables, while Fisher exact test was used when the expected cell value is less than five. Some data were collected together in one class due to small number of observation when present on separated classes. Odd's Ratio (OR) and their 95% confidence intervals (95% CI) were calculated. Risk factors were estimated by binary logistic regression analysis. The results considered significant when the Probability (P value) was equal or less than 0.05.

**Results**

Table 1 shows that fishermen and control group were comparable regarding some socio-demographic and occupational data, where there were no significant differences between the two groups as regard age, level of education, income, marital status and duration of work. Most of the fishermen were smokers (86.3%) compared to 61.5% in control group and more than half of the fishermen were of normal weight (68.5%) in contrast to control group,

most of them were overweight and obese (47.7% and 27.4% respectively) and the differences between them were statistically significant ( $P < 0.001$ ).

Table 2 shows the occupational characteristics of fishermen, where the majority of them worked in-shore (81.5%). More than half of them worked in crews of  $\leq 10$  members (52.4%), on boats  $\leq 150$  HP (51.9%), stayed in fishing trip for  $\leq 10$  days (50.8%) and worked on less than 5 boats during their career

(53.8%). This table also reveals different specialties worked on the boat including skipper, mate, deckhand and mechanic (19.4%, 22.6%, 25.8%, and 17.7% respectively). About 55% of fishermen were using personal protective equipments (PPE), while the others worked without them. Table 3 shows that fishermen had a higher frequency of different health problems compared with control group and the differences between them were highly significant

**Table 1.** Frequency distribution of some socio-demographic, BMI and occupational data among fishermen and control group

Socio-demographic characteristics	Fisherman (n=124)		Control group (n=130)		X <sup>2</sup>	P-value
	No.	(%)	No.	(%)		
<b>Age (years):</b>						
$\leq 40$	74	59.7	80	61.5	0.092	0.762
$> 40$	50	40.3	50	38.5		
<b>Level of education:</b>						
Illiterate	86	69.4	55	42.3	0.679	0.781
Read and write	15	12.1	25	19.2		
Primary education	23	18.5	50	38.8		
<b>Income:</b>						
Enough	20	16.1	30	23.1	1.94	0.163
Not enough	104	83.9	100	76.9		
<b>Smoking status:</b>						
Smokers	107	86.3	80	61.5	20.02	<b>&lt;0.001</b>
Non smokers	17	13.7	50	38.5		
<b>Body mass index (kg/m<sup>2</sup>):</b>						
Under weight	6	4.8	0	0.0	66.591	<b>&lt;0.001</b>
Normal weight	85	68.5	36	27.7		
Over weight	33	25.8	62	47.7		
Obese	0	0.0	32	24.6		
<b>Marital status:</b>						
Married	93	75.0	92	70.8	0.57	0.449
Unmarried*	13	25.0	38	29.2		
<b>Duration of work(year):</b>						
$\leq 20$	70	56.4	80	61.5	0.68	0.409
$> 20$	54	43.6	50	38.5		

\* including single and widow fishermen

**Table 2.** Frequency distribution of occupational characteristics of fishermen

Socio-demographic characteristics	Fisherman (n=124)	
	No.	(%)
<b>Type of fishing:</b>		
In-shore fishing	101	81.5
Off-shore fishing	23	18.5
<b>Duration of fishing trip \ day:</b>		
$< 10$	61	49.2
$\geq 10$	63	50.8
<b>No. of working hours \ day</b>		
$\leq 10$	77	62.1
$> 10$	47	37.9
<b>Size of working crew :</b>		
$\leq 10$ members	65	52.4
$> 10$ members	59	47.6
<b>Using personal protective equipments (PPE)</b>	69	55.6
<b>Not using PPE</b>	55	44.4
	<b>No=106*</b>	<b>%</b>
<b>Type of work on boat:</b>		
Skipper	24	19.4
mate	28	22.6
deckhand	32	25.8
Mechanics	22	17.7
<b>Type of boat worked on (HP):</b>		
$\leq 150$	55	51.9
$> 150$	51	48.1
<b>No. of boats worked on during career:</b>		
$\leq 5$	57	53.8
$> 5$	49	46.2

\* There are 18 off-shore fishermen did not work on boats

( $P < 0.001$ ), where more than 91.0% of fishermen had musculoskeletal complaints during the last 12 month compared to 38.5% in the control group. Also 62.9% of the fishermen suffered from severe stress compared to 8.5% in controls. More than 90.0% of the fishermen exposed to accidents during their work, 73.4% of them reported injuries during these

accidents, compared to lower percent (21.5% and 21.5% respectively) among their controls. 37.9% of fishermen suffered from auditory complaints compared to 15.4% in the control group. More than half of the fishermen exposed to sunburn during working on the board of the boat (57.3%), compared to 6.2% among their controls.

**Table 3.** Frequency distribution of health problems among fishermen and control group

Health problems	Fisherman (n=124)		Control group (n=130)		X <sup>2</sup>	P-value
	No.	(%)	No.	(%)		
Musculoskeletal complaints:	113	91.1	50	38.5	76.569	<0.001
Stress level:						
Mild to moderate	46	37.1	119	91.5	174.000	<0.001
Severe	78	62.9	11	8.5		
Exposure to accidents during work:	112	90.3	28	21.5	68.516	<0.001
Injuries due to accidents:	91	73.4	28	21.5	49.24	<0.001
Auditory complaints:	47	37.9	20	15.4	14.119	<0.001
Exposure to sunburn during work:	71	57.3	8	6.2	77.348	<0.001

Table 4 shows that 17.7% of fishermen were exposed to mean sound level of  $113 \pm 5.72$  dB in the engine room, 21% exposed to  $90.83 \pm 5.7$  dB on board of boats < 150 HP and  $104.82 \pm 7.87$  dB onboard of non-maintained boats (19.3%) for mean working times exceeding occupational safety and health

administration (permissible exposure level) (OSHA PEL). On the other hand, there is no risk for fishermen working on board of boats >150 HP (59.7%) as they were exposed to mean sound level of  $77.55 \pm 6.42$  dB which according to OSHA PEL has no time limits.

**Table 4.** Level of noise exposure on different boats among fisherman

Type of vessel	Total no. of exposed fishermen		Noise level/dB Mean $\pm$ SD	Working hours Mean $\pm$ SD	OSHA PEL for sound levels
	No.	%			
At engine room of boats >150 HP	22	17.7	$113 \pm 5.72$	$1.38 \pm 0.68$	110 dB for 0.5 hour
On board of boats >150 HP	74	59.7	$77.55 \pm 6.42$	$13.03 \pm 2.67$	Unlimited exposure
On board of boats <150 HP	26	21	$90.83 \pm 5.7$	$9.53 \pm 2.93$	90 dB for 8 hours
On board of not maintained boats	24	19.3	$104.82 \pm 7.87$	$8.82 \pm 3.26$	105 dB for one hour

**Table 5.** Logistic regression analysis for significant predictors of occupational health problems among fishermen

Dependent Factors	Independent Factors	B	S.E.	Wald	OR (95% CI)	P-value
Musculo-skeletal complaints	Long duration of work\y	0.317	0.094	11.32	1.35(1.14-2.60)	<b>0.001</b>
	Severe stress	2.88	1.22	7.45	18.73(2.28-153.38)	<b>0.006</b>
	$\leq 10$ working days\trip:	2.33	1.07	4.76	10.35(1.27-84.46)	<b>0.02</b>
	Small boat $\leq 150$ HP	1.55	0.817	3.618	4.72(1.05-23.43)	<b>0.04</b>
Stress level	Long duration of work\y	2.17	0.49	19.79	8.84(3.34-23.40)	< <b>0.001</b>
	In-shore fishing	1.19	0.42	9.58	4.30(1.70-10.86)	<b>0.005</b>
	>10 working hours\day	4.32	1.66	6.77	7.74(1.69-35.35)	<b>0.009</b>
	>5 boats worked on during career	1.11	0.44	6.30	3.04(1.27-7.27)	<b>0.012</b>
Injuries	In-shore fishing	1.90	0.49	14.65	6.71(2.53-17.79)	< <b>0.001</b>
	Small boat $\leq 150$ HP	2.53	0.77	10.60	1.97(1.07-3.36)	<b>0.001</b>
	Severe stress	0.99	0.41	5.67	2.66(1.16-6.08)	<b>0.017</b>
	Mate & deckhand	0.59	0.26	5.04	2.55(1.32-3.92)	<b>0.02</b>
	Not using PPE	0.63	0.28	5.07	2.03(1.88-4.64)	<b>0.02</b>
Auditory complaints	>10 working hours\day	1.16	0.57	4.07	2.07(1.95-6.20)	<b>0.04</b>
	Mechanic	1.26	0.27	21.38	2.24(1.56-3.73)	< <b>0.001</b>
	Not using PPE	1.30	0.389	11.16	2.20(1.12-3.58)	<b>0.001</b>
Sunburn complaints	Small boat $\leq 150$ HP	0.10	0.407	7.41	3.03(1.36-6.74)	<b>0.006</b>
	Age	1.53	0.414	13.77	4.65(2.06-10.48)	< <b>0.001</b>
	Skipper, mate & deckhand	0.744	0.211	12.44	1.95(1.01-3.71)	< <b>0.001</b>
	>10 working hours\day	0.687	0.376	3.33	1.98(1.05-4.15)	<b>0.041</b>

B, estimated logit coefficient; S.E., standard error of the coefficient; Wald, [B/S.E.]<sup>2</sup>

Table 5 shows that the most significant predictors of MSCs among fishermen were long duration of work, long fishing trip more than 10 days, working on small boats and severe stress. While the most significant predictors of severe stress were in-shore fishermen with long working period, for more than 10 hours per day, on large number of boats during their career. For injuries skipper, deckhand and mate worked in-shore, for long hours per day, on small boats with severe stress, and not using PPE were the significant predictors. Also the most significant predictors of auditory complaints among fishermen were mechanics, working on small boats and not using PPE. For sunburn the most significant predictors were old age fishermen with long working hours per day and skipper, mate and deckhand.

### Discussion

In the present study, fishermen and control group were comparable regarding socio-demographic and occupational characteristics, where there were no significant differences between the two groups as regard age, level of education, income, marital status and duration of work. Most of the fishermen were smokers in contrast to smaller percent in control group. More than half of the fishermen were normal weight in contrast to control group; most of them were overweight and obese. This may be due to hard working of fishermen, where they stayed for long hours on vessel board with bad eating habits.

The present study revealed that most of the fishermen were working in-shore. More than half of them worked in crews of <10 members, on boats of  $\leq 150$  HP, stayed in fishing trip for  $\leq 10$  days and worked on less than 5 boats during their career. About 55% of fishermen were using PPE, mainly boots, garments then gloves. This is confirmed by previous studies, where Tander et al. (6) reported that the working conditions of fishermen are relatively hard. Their daily work hours are fairly long, they spent long periods at sea on board of vessels and carry heavy boxes and equipments.

The results of the present study revealed that the fishermen had a higher frequency of different health problems compared with control group and the differences between them were statistically significant. This is in agreement with Kaerlev et al. (17) who reported that the psychosocial work environment of traveling overseas has a number of special and different risks leading to severe health hazards in fishermen especially MSDs and stress. Also Harris et al. (3) stated that fishermen complain of health problems related to noise exposure as a result of long periods of staying near from machines and vessel motor. Moreover, Burke et al. (10) found that the risk of skin and eye damage was very high due to sun exposure which is greater at sea than on land because of the unhindered reflection of the sunlight.

Our study showed that there is no risk for fishermen working on board of boats >150 HP as they were exposed to mean sound level of  $77.55 \pm 6.42$  dB which according to OSHA PEL has no time limits. As age-induced hearing loss produces a lag time between exposure and diagnosis and as short-term employment is common in these seafaring trades, it is possible that the exposure could be a result of previous working conditions. Noise exposure from various sources is commonly expressed as the average sound pressure level over a specific time period, such as eight or 12 hours (18). Kaerlev et al. (17) showed an average sound level on  $103 \text{ dB} \pm 4.4$  dB in the main engine room and  $75 \text{ dB} \pm 8.7$  dB in the control rooms. Svendsen et al. (18) reported similar levels in engine rooms. Noise levels on Danish fishing vessels commonly reach 102-110 dB in the engine room and 75-85 dB in the working and living areas (24).

The present study shows that in-shore fishermen suffered significantly from severe stress about three times more than off-shore fishermen and the risk were significantly higher among mate and deckhand more than skipper and mechanic. Fishermen who worked for more than 20 years were significantly at high risk of severe stress more than the others and the risk significantly increased in fishermen who worked in fishing trip for more than 10 days and for more than 10 hours per day compared to the others. With our study, Harris et al. (3) found that the long working hours at sea with long periods of absence which limit the social contact and lead to bad relationships between fishermen and their friends and families were associated with high stress level that adversely affect the mental health. But these results disagreed with previous study, Leclerc et al. (19) who found that the risk of severe stress was the same among in-shore and off-shore fishermen. But Lagace (20) found that fisherman did not work on his own boat and worked on many boats at high risk of severe stress which is consistent with the results of our study that reveal high risk among fishermen worked on more than 5 boats during their career.

The result of the present study showed that fishermen above 40 years old were significantly at high risk of injuries four times more than younger ones which is consistent with Norrish and Cryer (21). This is consistent with Moore (22) who found that the highest rate of incapacity occurred in the 61-70 year old age group, and the lowest in the 21-30 year old age group. The differences are significant. However, these risk factors were not confirmed by logistic regression analysis, Jensen (23) found that there was no significant difference in injury rates by age. Also, the in-shore fishermen in our study were significantly at risk of injuries about seven times more than off-shore fishermen and this risk increased among fishermen with severe stress who worked for more than 10 hours per day. In agreement with our results, Jensen (23) revealed that

in-shore fishermen were at higher risk due to the different nature of their work and the heavy equipments used. Moreover, fishermen worked on small boats less than 150 HP and did not use personal protective equipments were significantly at high risk of injuries than the others and this risk was significantly higher among skipper, deckhand and mate more than mechanics. The results of the present study showed that in-shore fishermen were significantly at higher risk of auditory complaints about five times more than off-shore fishermen. Also, the risk was increased in those not using personal protective equipments and working on small boats less than 150 HP. Also, the risk was significantly higher among mechanics. In agreement with our results, Soll-Johanning et al. (24) found that the engine officers and engine room crew are thus more heavily exposed to noise than other seafarers.

The results of this study showed that the risk of occurrence of sunburn was significantly higher among fishermen above 40 years old who worked for more than 10 hours/day and the risk was significantly increased in skipper, deckhand and mate more than mechanics. Molly et al. (25) demonstrated that all fishermen on board vessel were at risk of sunburn exposure, however long hours of staying at sea would increase the risk.

From this study, it can be concluded that the fishermen in the Alexandria city are exposed to many hazards that lead to many diseases including musculoskeletal problems and problems with the auditory system. It also shows that most of the fishermen are suffering from high stress, sunburn, and there is also the risk of accidents and injuries. It also found that the risk factors associated with these problems is spending long work hours in the sea, especially on small boats and instability on the same boat and do non-use of personal protection equipments. We recommended that fishermen can protect themselves from hazards to prevent health problems by using PPEs and proper first aid procedures to minimize the risk of complications. Call for other researches and promote other types of epidemiological studies to confirm association between risk factors and occupational health problems among fishermen.

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