

Occupational risk perception, stressors and stress of fishermen

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ABSTRACT

Background: The aim of this survey was to assess the stress in fishermen by analysing its relationship with sociodemographic and professional characteristics, by evaluating work stressors, and by estimating psychosomatic symptoms.

Materials and methods: This cross-sectional survey involved representative sample of 828 artisanal and coastal fishermen. All participants were men and had a regular activity for at least 2 years. We used an individual questionnaire inspired by those of the National Institute for Research and Security of France and of the Karasek's Job Content Questionnaire.

Results: The prevalence of self-reported stress was 53.9%. The average age was 36.7 ± 8.7 years, it was higher among stressed than non-stressed. The prevalence of stress was higher in subjects with dependents (69.1%) versus 30.9% without dependents, and among those living alone (61%) versus 47.5% among those living in couple. The prevalence of harmful habits was 68.5% for tobacco smoking or snuff, 36.8% for cannabis smoking, 35.4% for alcohol consumption, 8.6% for other psychotropic substances and medications, and 21.4% for antalgic drugs. These toxic habits were significantly higher in stressed individuals. Thirty-three point seven per cent had self-reported chronic pathologies (40.5% among stressed vs. 25.7% non-stressed). Thirty-four per cent were overweight (38.3% among stressed vs. 28.8% non-stressed), and 14% obese (19.3% among stressed vs. 7.6% non-stressed). The average daily working hours were 11.2 h (12.8 h among stressed subjects vs. 10.5 h non-stressed). Psychological demand was higher in stressed subjects, while decisional latitude and social support were lower. Psychosomatic symptoms were higher among stressed than non-stressed. The main suggestions of the fishermen were to improve income, social welfare, health insurance, safety on board, quality of lifestyle, sport and leisure activities, information and awareness campaigns of occupational stress, and fight against addictive behaviours.

Conclusions: Fishermen were at a high risk of chronic stress with its health consequences. Health promotion and education initiatives should be conducted to raise fishermen's awareness of the dangers of occupational stressors.

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Key words: fisheries, occupational, stress, health risk

INTRODUCTION

It has long been known that fishing is one of the most dangerous occupations [1]. The relentless struggle of traditional fishermen with the sea continues since centuries, and the maritime environment remains particularly dangerous to those who work there, especially in developing countries [2].

In these countries, risk-taking behaviour among fishermen is still an epidemiological reality, associated with significant morbidity and mortality [3, 4].

Fishing is highly stressful and fishermen are particularly affected by stress because they are exposed to high psychosocial factors at work and organisational constraints

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related to difficult working conditions and financial difficulties with worries about their daily gain. The dangerousness and complexity of this profession is explained by an arduous and laborious activity with numerous and countless constraints requiring a sustained degree of attention. The main stressors of fishermen are working conditions (atypical work schedules, long work hours, density of work, unsafe job, workplace injustice and violence), lifestyle (high prevalence of consumption of psychoactive substances, sedentary, unbalanced meals, lack of leisure, etc.), and socio-economic difficulties (precarious work, low income, piecework, work-family conflict) [5]. The pathophysiologic effects of chronic stress, resulting from work-related stressors, contribute to a wide range of unhealthy behaviours, psychosomatic symptoms, and illnesses, including mental disorders, gastrointestinal disorders, cardiovascular diseases and its risk factors (hypertension, obesity, diabetes, and the metabolic syndrome), musculoskeletal disorders, and acute traumatic injuries [5]. Abusive behaviour in relation to working conditions and lifestyle is associated with health problems in fishermen: pattern of taking meals, obesity, high consumption of psychoactive substances, etc. [6].

However, few studies have in some way investigated the occupational stress of fishermen in Morocco. The aim of this survey was to assess the level of stress in fishermen by analysing its relationship with sociodemographic and professional characteristics, by evaluating work stressors among self-reported stressed and non-stressed fishermen, and by estimating psychosomatic symptoms.

MATERIALS AND METHODS

FRAMEWORK AND TYPE OF STUDY

This observational and cross-sectional study was conducted from January to April 2018 in two ports of northern Morocco.

TARGET POPULATION

The survey involved representative sample of 1038 fishermen (40.7% of the exhaustive administrative list of 2552 fishermen). All participants were men, had a regular activity for at least 2 years, and worked in the coastal and artisanal fishing sector with small embarkations.

QUESTIONNAIRE

We used an individual questionnaire inspired by those of the National Institute for Research and Security of France [7], and the Karasek's Job Content Questionnaire (KJCQ) [8]. It comprised five parts:

- **Socio-demographic data:** age, body mass index, family status (living alone, living in couple), dependents (children, parents, and relatives), toxic habits (tea/coffee, tobacco, cannabis, alcohol, other psychoactive substances and med-

icines, antalgic drugs), regular physical activities — sports (at least three times per week), and chronic diseases.

- **Socio-professional data:** professional category, educational level, length of employment, choice of profession, daily working, income, medical coverage, welfare, and accidents during last 12 months (occupational, road, and home accidents).
- **Work stressors:** (i) A self-reported global question evaluated stress ("Since six months, do you feel stressed?"); (ii) Nine items inspired by the KJCQ, and regrouped in three domains related to the psychosocial environment in the workplace: psychological demands, decision latitude, and social support. The responses were on a 4-point Likert discontinuous scale from "totally disagree" to "totally agree". The answers "totally disagree" and "disagree" were considered as negative and the answers "agree" and "totally agree" as positive.
- **Psychosomatic symptoms related to stress:** The items were assessed with responses on a 4-point Likert scale from never to often. The answers "never" and "rarely" were considered as negative and the answers "sometimes" and "often" as affirmative.
- **Free-text zone** to allow fishermen to suggest priority actions to reduce stressors.

ETHICAL AND DEONTOLOGICAL ASPECTS

We previously contacted the Ministry of Fisheries delegate, the representatives of the fishermen associations and the occupational physicians to explain the purpose of the study and to obtain their support. The interviews took place within the occupational health service of fishermen and lasted approximately 20 minutes for each person. The singular colloquium with each fisherman was carried out with full respect of the confidentiality.

STATISTICAL ANALYSES

The statistical analyses were performed using the SPSS version 11.5 software package. The differences between groups were compared using t tests for continuous variables and chi-square tests for categorical ones. The statistical level of significance was established at 5%.

RESULTS

Eight hundred and twenty-eight people agreed to answer the questionnaire; the participation rate was 79.8%. To the question "Since six months, do you feel stressed?" 446 people responded positively. The prevalence of self-reported stress was 53.9%.

RELATIONSHIP BETWEEN SOCIODEMOGRAPHIC CHARACTERISTICS AND STRESS (TABLE 1)

The average age was 36.7 ± 8.7 years (40.8 ± 9.1 years among stressed subjects vs. 34.5 ± 8.3 years among

Table 1. Relationship between sociodemographic characteristics and self-reported stress

Sociodemographic characteristics	Total (n = 828)	Self-reported stress (n = 446; 53.9%)	No self-reported stress (n = 382; 46.1%)
Age [years]			
< 40	478 (57.7%)	218 (45.6%)	260 (54.4%)
≥ 40	350 (42.3%)	228 (65.1%)	122 (34.9%)
Average age	36.7 ± 8.7	40.8 ± 9.1	34.5 ± 8.3
Body mass index [kg/m²]			
Underweight	64 (7.7%)	31 (7%)	33 (8.6%)
Normal	394 (47.5%)	158 (35.4%)	236 (61.8%)
Overweight	281 (34%)	171 (38.3%)	110 (28.8%)
Obesity	115 (14%)	86 (19.3%)	29 (7.6%)
Family status			
Living alone	392 (47.3%)	239 (61%)	153 (39%)
Living in couple	436 (52.7%)	207 (47.5%)	229 (52.5%)
Dependents (parents, relatives, children, etc.)	645 (77.9%)	446 (69.1%)	199 (30.9%)
Harmful habits			
Tea/coffee consumption	759 (91.7%)	439 (98.4%)	320 (83.8%)
Tobacco smoking or snuff	567 (68.5%)	371 (83.2%)	196 (51.3%)
Cannabis smoking	305 (36.8%)	201 (45.1%)	104 (27.2%)
Alcohol consumption	293 (35.4%)	187 (41.9%)	106 (27.7%)
Other psychotropic substances	71 (8.6%)	32 (7.2%)	39 (10.2%)
Antalgic drugs	177 (21.4%)	139 (31.2%)	38 (9.9%)
Regular physical activities and/or sports	127 (15.3%)	28 (6.3%)	99 (25.9%)
Self-reported chronic diseases	279 (33.7%)	181 (40.5%)	98 (25.7%)
Musculoskeletal	228 (27.5%)	165 (37%)	63 (16.5%)
Neuropsychiatric	218 (26.3%)	159 (35.7%)	59 (15.4%)
Cardiovascular	159 (19.2%)	123 (27.6%)	36 (9.4%)
Respiratory	154 (18.6%)	85 (19.1%)	69 (18.1%)
Digestive	152 (18.4%)	117 (26.2%)	35 (9.2%)
Metabolic	129 (15.6%)	83 (18.6%)	46 (12%)

non-stressed; $p < 0.001$). About half lived in couples (52.7%) and 77.9% had dependents. The prevalence of stress was higher in subjects with dependents (69.1%) versus 30.9% among those without dependents; $p < 0.001$, and among those living alone (61%) versus 47.5% among those living in couple; $p < 0.01$. The prevalence of harmful habits was 91.7% for tea-coffee (more than 4 cups or glasses a day), 68.5% for tobacco, 36.8% for cannabis, 35.4% for alcohol, 8.6% for other psychotropic substances and medications (antidepressants, tranquilizers and sedatives), and 21.4% for antalgic drugs use. These toxic habits were significantly higher in stressed individuals. Thirty-three point seven per cent had self-reported chronic diseases (40.5% among stressed and 25.7% among non-stressed, $p < 0.001$). Their prevalence was 27.5% for musculoskeletal dysfunctions, 26.3% for neuropsychiatric illness (head ache, migraine, anxiety, depression), 19.2% for cardiovascular diseases (16.8% high blood pressure and 13.2% phlebitis), 18.6% for respiratory diseases (17.3% rhinitis, 7.5% asthma, 4.5% chronic obstructive pulmonary disease, and 6.6% chronic bronchitis), 18.4% for digestive disorders (gastritis, heartburn, gastric ulcer), and 15.6% for metabolic

diseases (6.3% diabetes, 7.2% hypercholesterolaemia). The prevalence of dermatologic diseases was 71% (67% traumatic skin disorders, 44% fungal infections, and 3% contact dermatitis).

Forty-eight per cent were overweight or obese (57.6% among stressed and 36.4% among non-stressed, $p < 0.05$). Fifteen point three per cent regularly performed sports or physical activity outside work (6.3% in stressed vs. 25.9% in non-stressed).

RELATIONSHIP BETWEEN SOCIO-PROFESSIONAL CHARACTERISTICS AND STRESS (TABLE 2)

The average work seniority was 14.8 ± 4.6 years (15.1 ± 4.8 years among stressed vs. 13.6 ± 3.7 years among non-stressed; $p < 0.05$). The average daily working hours were 11 h 12 min \pm 22 min (12 h 48 min \pm 54 min among stressed vs. 10 h 30 min \pm 42 min among non-stressed; $p < 0.05$). In the last 12 months, 28.1% had been victims of accidents (38.8% in stressed vs. 15.7% in non-stressed; $p < 0.001$). The prevalence of stress was lower among those who had chosen their profession than those who had not chosen it (43.3% vs. 56.7%; $p = 0.01$). For fishermen, the

Table 2. Relationship between socio-professional characteristics and self-reported stress

Socio-professional characteristics	Total (n = 828)	Self-reported stress (n = 446; 53.9%)	No self-reported stress (n = 382; 46.1%)
Professional categories			
Pilots/co-pilots	143 (17.3%)	85 (59.4%)	58 (40.6%)
Mechanics	121 (14.6%)	77 (63.6%)	44 (36.4%)
Fishermen	564 (68.1%)	284 (50.4%)	280 (49.6%)
Educational level			
Superior	26 (3.1%)	15 (57.7%)	11 (42.3%)
Secondary	209 (25.2%)	116 (55.5%)	93 (44.5%)
Primary	509 (61.5%)	291 (57.2%)	218 (42.8%)
Illiterate	84 (10.1%)	24 (28.6%)	60 (71.4%)
Work seniority [years]			
≤ 5	117 (14.1%)	48 (41%)	69 (59%)
6–15	271 (32.7%)	151 (55.7%)	120 (44.3%)
> 15	440 (53.2%)	247 (56.1%)	193 (43.9%)
Average	14.8 ± 4.6	15.1 ± 4.8	13.6 ± 3.7
Average working hours			
Daily	11.2 ± 0.3	12.8 ± 0.6	10.5 ± 0.2
Weekly	67.2 ± 0.7	76.8 ± 0.9	63 ± 0.7
Choice of profession			
Yes	482 (58.2%)	193 (43.3%)	289 (75.7%)
No	346 (41.8%)	253 (56.7%)	93 (24.3%)
Accidents during last 12 months	233 (28.1%)	173 (38.8%)	60 (15.7%)

average income in form of commissions was about 400 dollars per month. Eighty-one per cent underwent occupational health services and 85% received paid sick days.

WORK STRESSORS AND THEIR RELATIONSHIP WITH STRESS (TABLES 3 AND 4)

For the psychological demand, 87.8% thought they had a heavy workload, 76.2% were forced to work overtime and 66.2% complained of time and performance pressure. For the decision latitude, 49.4% found their work boring, 28.7% were satisfied with their work and 55.4% wanted to change it. For the social support, 47.6% suffered from a sense of injustice from the hierarchy, 76.4% felt unsafe with feelings of isolation at sea and distance from the family, and 56.7% felt unfriendly attitudes in the workplace from colleagues with a sense of group pressure. Psychological demand was significantly higher in stressed subjects, while decision latitude and social support were significantly lower.

PSYCHOSOMATIC SYMPTOMS AND THEIR RELATIONSHIP TO STRESS (TABLES 5 AND 6)

The following psychosomatic symptoms were reported; neurovegetative disorders (44%), nervous tension (61.5%), mood disorders (53.3%), cognitive disorders (23.6%), and sleep disorders (43.2%) All the psychosomatic symptoms were significantly higher in the stressed subjects than in the non-stressed ones

SUGGESTIONS OF FISHERMEN TO REDUCE OCCUPATIONAL STRESS

The main suggestions were to improve income (96.6%), social welfare (92.7%), health insurance (89.8%), safety on board (91.8%), quality lifestyle (90.4%), sport and leisure activities (82%), information and awareness campaigns of occupational stress (78.5%), and fight against addictive behaviours (68.1%).

DISCUSSION

The occupational stress process refers to the ways in which sources of stress in the work environment (stressors) can lead to psychological, behavioural, or physiologic manifestations of stress (strain), and to longer-term health effects. The National Institute for Occupational Safety and Health (NIOSH) and the International Labour Office have defined occupational stress as the harmful physical and emotional responses that occur when job requirements do not match or exceed a worker's capabilities, resources, or needs. As NIOSH has stated, stressful working conditions (stressors) "play a primary role in causing job stress," but modifiers "can intervene to strengthen or weaken this influence [9]. These modifiers include individual factors, such as coping style, and other work environment factors, such as social support. Several definitions and models have been proposed to evaluate the psychosocial factors of occupational stress and to integrate its complexity. The

Table 3. Work stressors

Work stressors	Totally agree	Agree	Disagree	Totally disagree
Psychological demands				
Do you think you have a heavy workload with performance pressure?	385 (46.5%)	342 (41.3%)	76 (9.2%)	25 (3%)
Do you have to work overtime?	388 (46.9%)	243 (29.3%)	131 (15.8%)	66 (8%)
Do you think you have a pressure of time and performance?	329 (39.7%)	219 (26.5%)	194 (23.4%)	86 (10.4%)
Decision latitude				
Are you satisfied with your work?	87 (10.5%)	151(18.2%)	326 (39.4%)	264 (31.9%)
Do you feel bored in your work?	268 (32.3%)	142(17.1%)	235 (28.4%)	183 (22.2%)
Would you like to change jobs?	264 (31.9%)	195(23.5%)	248 (29.9%)	121 (14.7%)
Social support				
Do you feel unfriendly attitudes in your work with a feeling of group pressure?	375 (45.2%)	96 (11.5%)	246 (29.8%)	111 (13.5%)
Do you feel insecure in your work with a sense of isolation at sea and/or distance from your family?	195 (23.5%)	438 (52.9%)	65 (7.8%)	130 (15.8%)
Do you think you are treated unfairly in your work?	272 (32.8%)	123 (14.8%)	337 (40.7%)	96 (11.7%)

Table 4. Relationship between work stressors and self-reported stress

Work stressors	Total (n = 828)	Self-reported stress (n = 446; 53.9%)	No self-reported stress (n = 382; 46.1%)
Psychological demands			
A heavy workload with performance pressure	727 (87.8%)	428 (96%)	299 (78.2%)
Overtime work	631 (76.2%)	389 (87.2%)	242 (63.3%)
Pressure of time and performance	548 (66.2%)	370 (83%)	178 (46.5%)
Decision latitude			
Job satisfaction	238 (28.7%)	58 (13.2%)	180 (47.1%)
Boring work	410 (49.4%)	336 (75.3%)	74 (19.3%)
Changing jobs	459 (55.4%)	330 (74%)	129 (33.7%)
Social support			
Unfriendly attitudes in work with a feeling of group pressure	477 (56.7%)	274 (61.6%)	203 (53.1%)
Insecure in work with a sense of isolation at sea and/or distance from family	633 (76.4%)	368 (82.5%)	265 (69.3%)
Treated unfairly in a work	395 (47.6%)	231 (51.7%)	164 (43%)

fields of sociology and labour relations have contributed important insights to the integrated occupational stressor models. Two models were the most used [5]. The first is the Job Demand-Control (JDC) model. It is also known as the job strain model, where stress and subsequent strain is thought to be arising primarily due to characteristics of work. This model assumes that strain arises from an imbalance between demands and decision latitude in the workplace, where lack of control is seen as an environmental constraint on response capabilities. Decision control consists of two components, which are highly correlated in job situations: autonomy and opportunities to develop skills. The JDC model characterises jobs by their combination of demands and control. Jobs with high demands and low control, such as that of fishermen result in strain. The lack of control over all aspects of the job is recognized as a key factor

in the development of occupational stress [10]. The Job Demand-Control-Support (JDCS) model includes social support as an additional dimension. Lack of social support can include social isolation from co-workers, few opportunities for collaboration and therefore a lack of new learning, competition among workers, and bullying and harassment [8]. The second model is the Effort–Reward Imbalance (ERI) model. It shares some elements with the JDCS model, while emphasizing social reciprocity and the imbalance between the effort required in a job and the rewards provided by this job. In the ERI model, “effort” can be due to extrinsic factors, such as high workload, or intrinsic characteristics, such as the worker’s “over commitment”. “Reward” includes esteem reward, such as respect and support, income, and status control, such as job security, job stability, and prospects for promotion or demotion [11].

Table 5. Psychosomatic symptoms

Symptoms of stress	Often	Sometimes	Rarely	Never
Neuro-vegetative disorders				
Do you feel palpitations?	120 (14.5%)	110 (13.2%)	489 (59.1%)	109 (13.2%)
Do you feel pain in your heart?	126 (15.2%)	63 (7.6%)	394 (47.6%)	245 (29.6%)
Do you feel oppression of chest?	107 (12.9%)	84 (10.1%)	371 (44.8%)	266 (32.2%)
Do you feel sweats in the absence of physical effort?	134 (16.2%)	145 (17.5%)	421 (50.8%)	128 (15.5%)
Do you feel dry mouth, nausea and/or digestive disorders?	106 (12.8%)	93 (11.2%)	264 (31.9%)	365 (44.1%)
Do you feel abdominal pain?	121 (14.6%)	151 (18.2%)	267 (32.2%)	289 (35%)
Do you feel muscle pains, cramps or sensations of muscle stiffness?	303 (36.3%)	53 (6.5%)	193 (23.4%)	279 (33.8%)
Nervous tension				
Do you feel sensations of discomfort?	326 (39.3%)	168 (20.3%)	179 (21.6%)	155 (18.8%)
Do you feel tremors of extremities?	60 (7.2%)	96 (11.6%)	221 (26.7%)	451 (54.5%)
Do you have headaches at the end of a workday?	302 (36.4%)	190 (22.9%)	154 (18.6%)	182 (22.1%)
Mood disorders				
Do you have anxiety?	194 (23.4%)	112 (13.5%)	363 (43.8%)	159 (19.3%)
Do you have irritability?	295 (35.6%)	139 (16.8%)	327 (39.4%)	67 (8.2%)
Do you have discouragement or pessimism?	136 (16.4%)	92 (11.1%)	264 (31.9%)	336 (40.6%)
Cognitive disorders				
Do you have difficulty concentrating?	94 (11.3%)	80 (9.6%)	338 (40.9%)	316 (38.2%)
Do you have memory problems?	115 (13.9%)	63 (7.6%)	490 (59.1%)	160 (19.4%)
Sleep disorders				
Do you have difficulty falling asleep?	197 (23.8%)	137 (16.5%)	410 (49.5%)	84 (10.2%)
Do you have interrupted sleep?	221 (26.6%)	78 (9.4%)	489 (59.1%)	40 (4.9%)
Do you feel like you did not sleep?	135 (16.3%)	121 (14.6%)	327 (39.4%)	245 (29.7%)

Table 6. Relationship between psychosomatic symptoms and self-reported stress

Psychosomatic symptoms	Total (n = 828)	Self-reported stress (n = 446; 53.9%)	No self-reported stress (n = 382; 46.1%)
Neuro-vegetative disorders	364 (44%)	233 (52.2%)	131 (34.3%)
Palpitations	230 (27.7%)	194 (43.5%)	36 (9.4%)
Pain in your heart	189 (22.8%)	227 (51%)	38 (10%)
Oppression of chest	191 (23%)	146 (32.7%)	45 (11.8%)
Sweats in the absence of physical effort	279 (33.7%)	151 (33.8%)	128 (33.5%)
Dry mouth, nausea and/or digestive disorders	199 (24%)	140 (31.3%)	59 (15.5%)
Abdominal pain	279 (32.8%)	174 (39.2%)	105 (27.5%)
Muscle pains, cramps or sensations of muscle stiffness	356 (42.8%)	231 (51.8%)	125 (32.7%)
Nervous tension	509 (61.5%)	351 (78.7%)	158 (41.4%)
Sensations of discomfort	494 (59.6%)	349 (78.3%)	145 (37.9%)
Tremors of extremities	156 (18.8%)	119 (26.6%)	37 (9.6%)
Headaches at the end of a workday	492 (59.3%)	338 (75.7%)	154 (40.3%)
Mood disorders	441 (53.3%)	343 (76.9%)	98 (25.7%)
Anxiety	306 (36.9%)	213 (47.7%)	93 (24.3%)
Irritability	434 (52.4%)	339 (76%)	95 (24.8%)
Discouragement or pessimism	228 (27.5%)	189 (42.3%)	39 (10.2%)
Cognitive disorders	195 (23.6%)	144 (32.3%)	51 (13.4%)
Difficult concentration	174 (20.9%)	143 (32.1%)	31 (8.1%)
Memory problems	178 (21.5%)	130 (29.1%)	48 (12.5%)
Sleep disorders	358 (43.2%)	237 (53.1%)	121 (31.7%)
Difficulty falling asleep	334 (40.3%)	232 (52.1%)	102 (26.7%)
Interrupted sleep	299 (36%)	183 (41.2%)	116 (30.3%)
Feeling like not have slept	256 (30.9%)	180 (40.3%)	76 (19.8%)

In 2014, the Moroccan National Observatory for Drugs and Addictions reported that the prevalences of tobacco smoking, cannabis consumption and alcohol consumption among Moroccan male in general population aged over 20 were 34.5%, 9%, and 14%, respectively [12]. In our study, the prevalence of these harmful habits was higher: 68.5% for tobacco smoking and snuff, 36.8% for cannabis smoking, and 35.4% for alcohol consumption. Nevertheless, the prevalence was significantly higher among stressed than non-stressed: for tobacco smoking and snuff (83.2% vs. 51.3%; $p < 0.001$), for cannabis smoking (45.1% vs. 27.2%; $p < 0.001$), and for alcohol consumption (41.9% vs. 27.7%; $p < 0.001$). The prevalence was as high as in the previous study on consumption of addictive substances amongst Moroccan fishermen: 58.5% for tobacco smoking, 12.3% for snuff, 36.2% for cannabis smoking, and 36.5% for alcohol consumption [13]. Cannabis is highly consumed in the northern Morocco, because it is cheaper than manufactured cigarettes [14]. Fishermen were classified as a population of heavy consumers of psychoactive substances [15]. In a meta-analysis among fishermen [6, 16], the respective prevalences of smoking tobacco in Turkey (81%), Scotland (38%), Greece (40%) and Spain (60%) were as high as in our study. The fishermen experience a decrease in alertness and extreme fatigue, thus justifying the use of stimulants to maintain satisfactory levels of concentration and arousal. These offsets, which were very high among fishermen in general, were even more important in stressed than non-stressed subjects and were solutions for stress relief. Regardless of its physiological impact, stress also affects our behaviour and our way of thinking. Several studies have reported that increased drug, alcohol consumption, dietary fat, tobacco use, and substance abuse relapse coincide with the presence of stressful life episodes. These studies found that poor lifestyle habits might be more harmful to health than stress itself [6].

Fishing is an occupational activity demanding high energy levels and that provokes overload of the fisheries' employees, thus setting limitations in their ability for other physical activity of desirable type, which could act as protective factor against obesity. There is evidence that low education has been related aetiologically to obesity incidence [6, 17, 18]. Only 15.3% of our fishermen regularly practiced sports or physical activity outside work, and 48% were overweight or obese. In the Greek study, 66% of fishing workers did not perform any kind of exercise outside work, and 78% were overweight or obese [16].

Stress increases with advancing age and the concerns of family life [19]. The average age of our fishermen was 36.7 ± 8.7 years. It was significantly higher among stressed (40.8 ± 9.1 years old) than non-stressed (34.5 ± 8.3 years old). It was close to Andalusian fishermen (40.3 years) [20].

Among our fishermen, the prevalence of stress was higher among those with dependents or living alone. Stress increases with job seniority [19]. In our study, the average of work seniority was 14.8 ± 4.6 years (15.1 ± 4.8 years stressed vs. 13.6 ± 3.7 years non-stressed, $p < 0.001$). The average daily working time of our fishermen was 11 h 12 min (12 h 48 min among stressed vs. 10 h 30 min among non-stressed, $p < 0.001$). The Greek study indicates the irregular working hours' pattern and the nature of the fishing occupational activity itself as causative for physical and psychological overload. It is reported that for Greek fishermen, the average working hours exceeded 10 h per day [16]. This overload has been clearly evidenced in a study conducted among British fishermen in which it was reported that 16% of the fishermen had been involved in a fatigue related accident or incident. Forty-four per cent said they had worked to the point of exhaustion or collapse, 41% had fallen asleep at the wheel, and 43% had been so tired they had slept on the deck or in the gangway [21].

Our fishermen's income is mainly based on the quantity of fishes fished. This system has been shown to induce stress responses. Low income can be conceptualised as a component of socioeconomic position, along with education and occupation, or contributing to exposure to stressors. Low-wage workers are more likely to experience job insecurity, and less likely to receive paid sick days [5].

This exhaustion probably explains the unhealthy dietary habits, heavy consumption of psychoactive substances and lack of exercise. About one-third (28.1%) of our fishermen were victims of accidents during the last 12 months (38.8% among stressed vs. 15.7% among non-stressed, $p < 0.001$). Sleep disorders and stress are the main factors exposing workers to occupational accidents because they induce alertness disturbance at work [22]. According to an English study, work-related accidents among fishermen were four times more deadly than those encountered in miners, who were nevertheless considered to have a profession at high risk of accidents [23]. The profession of the fisherman is universally recognised as one of the most dangerous occupations, and a fisherman is about forty-four times more likely to die at work than a worker on land [2–4]. Fishermen, who had already been victims of an accident, would fear another accident. This behaviour would be part of post-traumatic stress disorder where stress would be a consequence rather than a factor in the occupational accident [24]. However unsafe and unpleasant working conditions can be psychosocial or physical stressors [5].

Studies have shown that the psychological demand of the worker increases with the level of education and the size of the job [25]. In our survey, stress was lower among illiterate fishermen (28.6%). It was more important for specialised fishermen and managers with complex tasks and

heavy responsibilities than fishermen without qualification, and with less complex duties. The choice of occupation, job satisfaction and decision-making are significant protective factors against stress [26]. The prevalence of stressed among our fishermen, who had chosen their profession, was significantly lower (40%) than those who did not had chosen their job (73.1%).

In our study, the psychological demand was high: about ninety per cent (87.8%) of fishermen thought they had a heavy workload with performance pressure, 76.2% were forced to work overtime and 66.2% complained of time pressure and performance. All these stressors were higher among stressed than non-stressed. Time constraints refer to the impression felt by the individual to work under time pressure and/or to have too much work in too short a time [27]. A United States study of shrimp fishermen in the Gulf of Mexico has shown that psychological demand in general and the heavy workload in particular remains a major stressors for fishermen [28]. The strong psychological demand is even more pronounced among the pilots directly responsible to the boat owners for performance. The professional stress among the fishermen is born from the strong psychological demand including work schedules exceeding 12 h continuously, a non-respect of the sleep-wake and work-rest time, of strong quantitative demands with a pressure of time and performance [28]. Another exogenous stressor lies in the geographical peculiarity of the port of Tangier being at the entrance to an important maritime crossroads, the Strait of Gibraltar, which requires special attention. The bad weather and the strong winds of the region further aggravate the situation [4].

The low decision latitude lies in the repetitiveness of the spots becoming monotonous and always controlled and supervised by the pilot even for simple and ordinary gestures leaving no room for manoeuvre. The decision latitude of our fishermen was low; only 28.7% were satisfied, 49.4% found their work boring, and 55.4% wanted to change the job.

Social support remains low amongst fishermen [29]. Hierarchical superiors, in particular ship-owners, have no recognition at work even during days of good fishing. Work on board requires artisanal and coastal fishermen to survive together in small embarkations. This co-existence is not always successful and “clans” are constantly forming (drug addict group, alcoholic group, anti-pilot group, etc.). Although the atmosphere seems calm, unapparent conflicts, discriminations and harassments occur and the support of colleagues is different depending on being or not being a member of the same group. There are even conflicts within the same group about its “leader”. The work-family conflict is a type of role conflict in which the demands of work and family are incompatible, making participation in both more difficult. It can be due to the

number of work hours or inflexibility of work schedules, or lack of supervisor or spousal support [5]. A French study reported that the decision latitude was significantly lower among seafarers compared to non-mariners and 16.6% of fishermen were in the “high risk of stress” category. Social support was low, 47.8% suffered from a sense of injustice from the hierarchy, 75.8% did not feel safe, and 50.3% felt unfriendly attitudes in the workplace from colleagues with a sense of group pressure [29]. An American study has confirmed the existence of a high rate of job dissatisfaction and feelings of injustice [28]. Thus, fishermen are exposed to increased levels of stress that are also fuelled by feelings of isolation at sea and by distance from the family [30]. Long working hours at sea do not give fishermen enough time to pay attention to their families, and even the moments they spend on the land are divided between sleep and the fishermen’s cafes.

The majority of studies agree that fishing is a profession with high psychological demands, low decision latitude, and low social support [28–30]. The combination of low latitude/ /high demand in a work situation defines the “job strain” and places the employee in the “tense” dial. “Isostrain” is the coexistence of a situation. Job strain and low social support can have a negative impact on the health and safety of workers [8]. If the stress is not diagnosed and taken care of early, the stressed fisherman ends up somatising his psychological problems and developing true psychosomatic and organic pathologies.

Neurovegetative stress-related symptoms may manifest as palpitations, precordialgia, chest tightness, sweating, or digestive disorders. The latter are exacerbated by shortened, off-the-shelf meals, sometimes not taken [24]. In our study, these disorders affected 44% of fishermen with a predominance of digestive complaints (32.8%). The literature confirms that gastrointestinal disorders are the leading symptom of fishermen and are largely stress-related [31]. The stress increases muscle tone, which can be manifested by pain, cramps, body aches and muscle stiffness. These symptoms were found in 42.8% of our fishermen.

This hypertonia of the striated musculature is further increased by the musculoskeletal disorders caused by the strong physical demands of the fishing profession [6]. Nervous tension at work, poor adaptation to stress, is responsible for sensations of headaches, discomfort and tremors of the extremities. In our survey, the prevalence of these different manifestations was 59.6%, 18.1% and 59.3%, respectively. Nervous tension was present in 61.5% of our fishermen. This condition leads to fatigue, a decrease in productivity and increases the risk of occupational accidents. This situation, known as “tension at work”, increased in Europe from 1991 to 1996, rising from almost 25% to 30%, according to the results of the surveys of the European

Foundation for the Improvement of Living and Working Conditions [32].

Mood disturbances, the direct consequences of emotional or physical exhaustion, are expressed as anxiety, irritability and depression [33]. Mood disorders were found among 53.3% of our fishermen. These mood disturbances can have disastrous consequences, including suicide, especially among susceptible individuals [34]. Stress has the ability to reduce performance because all the cognitive functions of the individual are then disturbed. Disruptions in cognitive function may manifest as concentration difficulties, memory problems, difficulties in maintaining the quality of work, or a lack of confidence in its value and abilities. All these disorders result from a mental overload which causes in the immediate time a decrease in the reliability of the cognitive process and which induces a greater probability of errors [31, 32].

Among our fishermen, 23.6% had cognitive disorders (20.9% difficult concentration and 21.5% memory problems). Stress does not seem to affect the cognitive functions of fishermen too much compared to other functions and occupations. A Japanese study has shown that the cognitive processes of perception, memory and comprehension are highly developed and functionally coordinated, especially among artisanal and coastal fishermen, as these processes are daily used at home for the identification and choice of fishing points [35]. Sleep disorders are often the first symptoms of stress, and lead to decreased alertness with delayed reaction. In our study, they were present in 43.2% of subjects: difficulty falling asleep (40.3%), interrupted sleep (36%) and feeling like not have slept (30.9%).

More than a third of our fishermen (33.7%) self-reported chronic diseases (40.5% among stressed vs. 25.7% among non-stressed; $p < 0.05$). Among them there were 27.5% with musculoskeletal disorders. The literature confirms that professional fishing is an exhausting profession, which includes musculoskeletal disorders related to significant physical and psychological constraints [19, 20]. The prevalence of metabolic and cardiovascular diseases was 15.6% and 19.2%, respectively. However, among people older than 40 years, the prevalence was 26.1% and 31.3%, respectively.

LIMITATIONS OF THE STUDY

Our study encountered two main limitations. Our survey was cross sectional; the healthy worker effect could create a selection bias. The weak points of self-reporting must be underlined especially for the consumption of psychoactive substances, mainly for alcohol. The prevalence of alcohol use was probably underestimated because the Muslim religion of our subjects prohibits its consumption and the related issues remain taboo. There was no solution to avoid or limit individual variation in self-reporting. The target was a global quantification and approach.

CONCLUSIONS

Artisanal and coastal fishermen were at a high risk of chronic stress with its health consequences. Health promotion and education initiatives should be conducted to raise fishermen's awareness of the dangers of stressors. Collective and individual prevention measures such as psychosocial safety climate (organizational policies, practices, and procedures) is designed to protect fishermen psychological health and safety [5].

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