

Alcohol and nicotine dependence in French seafarers

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ABSTRACT

Background. To study the relationship between alcohol abuse or dependence as diagnosed by the CAGE questionnaire, and nicotine dependence as diagnosed by Fagerström Test of Nicotine Dependence (FTND) in French seamen.

Materials and methods. French seamen were recruited from a stratified survey of 19 ports in France. The subjects completed a questionnaire during their annual medical check-up with occupational physicians and nurses of the Occupational Health Department (Service de santé des gens de mer).

Findings. Approximately forty-four per cent of male subjects were current smokers, and approximately sixty-three per cent of these were nicotine dependent according to FTND. More than 11% of male subjects drank alcohol every day. About 16% of these were alcohol dependent according to CAGE. A strong positive relationship has been shown between alcohol dependence and nicotine dependence. There was a highly significant difference between alcohol dependent and non-alcohol dependent subjects in the FTND. Conversely, nicotine dependent and non-nicotine dependent subjects significantly differed regarding several alcohol-related variables.

Conclusions. Alcohol and nicotine consumption is a major public health issue in seamen. A strong positive correlation was found between alcohol abuse or dependence and nicotine abuse or dependence. Some alcohol-related behaviours were associated with nicotine dependence, and some tobacco-related behaviours were also associated with alcohol dependence. These findings are novel for this kind of population in France. In view of these results, combined smoking cessation and alcohol consumption reduction policies should be developed in this population. Finally, future studies could analyze the work environment, which seems to be associated with consumption and dependency.

Key words: Substance dependence, alcohol drinking, smoking, epidemiology, occupational health

INTRODUCTION

Total alcohol consumption in litres of pure alcohol per head of the population has been constantly falling in France since the 1960s [1]. A recent study reported a fall in alcohol consumption since 2000, in terms of both daily consumption (from 27.8% to 20.3% in males between 2000 and 2005) and of the amount declared by the subjects themselves [2].

The prevalence of drunkenness declared during the course of the year and of alcohol abuse, however, has remained stable, and the prevalence of alcohol dependence increased between 1991 and 2005 [3]. Likewise, the prevalence of smoking has been in constant decline in the French population since the 1970s [2] while, in parallel, that of nicotine dependence has remained stable in regular smokers.

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In France, seamen's health is assessed in a yearly seafaring aptitude medical check-up, but without recording any statistics on addictive behaviour. European studies of the subject, however, although few, point to high levels of nicotine and alcohol consumption in seagoing workers. Lawrie, for example [4], reported that 38.4% of Scottish fishermen were current smokers. In Andalusia, 60% of seamen smoked [5]. In another province of Spain, the prevalence of smoking was 47.5% in seamen aged between 40 and 60 years [6]. Finally, a prevalence of over 80% was reported for seamen in the region of Cadiz [7]. A Polish study found that 72.9% of fishermen and 59.7% merchant seamen were smokers [8]. In 1990, the prevalence of alcohol dependence in Polish seamen was estimated at 5% [9].

Relationships between alcohol dependence and nicotine dependence have previously been shown [10, 11]. Pathologies such as lung cancer and cirrhosis of the liver are frequent in seamen [12] and are often associated with nicotine and alcohol consumption. More generally, several studies have reported that alcohol dependent smokers in the general population are more frequently nicotine dependent [13].

The present study sought to analyze the relationship between alcohol abuse and nicotine dependence in French seamen. Alcohol- and smoking-related behaviours of abuser or dependent seamen were also examined.

MATERIALS AND METHODS

THE STUDY

A cross-sectional survey was conducted during the year 2007. Seamen were randomly selected during their annual medical check-up by occupational physicians and nurses of the Occupational Health Department. The survey was stratified over 19 ports in France (not including any overseas French ports) in which the Occupational Health Department was present, so as to be able to take account of local differences in alcohol and nicotine consumption [14] and types of seagoing work. Two thousand subjects were recruited in total. In each stratum, a number of seamen were chosen according to the importance of the port without any empiric rule. Then, seamen were randomly selected during their annual medical check-up by the occupational physicians and nurses of the Seamen's Occupational Health Department. Questionnaires were filled out during the examination. For each stratum, the sample weight was the number of seamen in the port divided by the number of seamen sampled. We used the number of seamen who had a medical check-up in 2006 to estimate the number of seamen in the port. The sample weight was equal for all subjects in the same stratum. Finally, 1,928 of the 2,022 selected seamen filled out the questionnaire (response rate = 95.4%). The results were reported for male subjects ex-

clusively, as they constituted the overwhelming majority (96%) of the sample.

THE QUESTIONNAIRE

The questionnaire included such variables as current smoking status, age of smoking onset, smoking behaviour, frequency of alcohol intake, approximate alcohol consumption (number of glasses) for the days when the subject drank alcohol ("typical day"), and the number of drunkenness episodes over the previous year.

Mean daily alcohol consumption was estimated by "typical-day" glasses intake weighted for frequency (weighting = 1 for "every day", 3.5 for "2-5 times per week", and 7 for "once a week at most"), this result being multiplied by 10 to express consumption in grams of pure alcohol per day (g/day). A mean daily alcohol intake of 30 g/day or more is considered, according to the World Health Organization (WHO), to represent a health hazard.

Alcohol dependence was assessed by the DETA questionnaire [15], a validated French version of the CAGE questionnaire [16]. Summary scores were calculated across responses, and two or more positive answers were taken as the cut-off point for the definition of alcohol abuse or dependence. One hundred and thirty-two respondents failed to answer all four DETA questions. Of the 34 with some missing data, 25 were nevertheless included in one of the two categories (dependent vs. non-dependent) because, regardless of the missing data, their resulting total DETA score would not have led to a change in category. Of the 98 subjects who failed to respond to any of the four DETA items, 85 were non-drinkers with no history of alcohol consumption and could thus safely be categorized as non-dependent.

The Fagerström Test for Nicotine Dependence (FTND) was used to assess the degree of nicotine dependence in current smokers [17]. The global Fagerström score assesses the intensity of physical nicotine addiction: scores between 0 and 2 indicate no dependence; between 3 and 4, low dependence; between 5 and 6, medium dependence; between 7 and 8, high dependence; and between 9 and 10, very high dependence. Finally, the "high" and "very high" classes were merged because of their small sizes. A dichotomous FTND variable was constructed for scores greater than 2. Nicotine dependence could be extrapolated into two categories for 96 of the 106 respondents with one missing item out of the four dichotomous items on the FTND (see Table 4), their dependences being unaffected by the missing item.

Seamen were asked for information about alcohol and tobacco consumption at home and aboard, respectively. A question was included to establish in which place consumption was predominant. The question was "your consumption seems to be:" and possible answers were: "more at

sea than on land”, “more on land than at sea”, or “the same at sea as on land”.

STATISTICAL ANALYSIS

The internal consistency of the DETA and Fagerström questionnaires was assessed by Cronbach’s alpha coefficient.

SAS software’s “surveyfreq” and “surveymeans” procedures were used to provide estimators free of bias of proportions, mean values, and 95% confidence intervals (95% CI). Distributions of variables according to alcohol dependence and then to nicotine dependence were compared by Wald’s chi-square test for survey samples. Given the non-normal distribution of the quantitative variables, the mean values for the two groups were compared by applying the Mann-Whitney U test.

SAS software version 9.1 was used for data analysis.

RESULTS

GENERAL DESCRIPTION

One thousand eight hundred and forty-seven male subjects (95.3% of those selected) filled out the questionnaire. Most of them were married (57%), 34% were single and 9% were divorced/widowed. Their mean age was 38.5 years (95% CI = 38–39). Seamen have, as a whole, a low educational level (63% have less than a high school certificate equivalent level, 13% have a high school certificate equivalent level, and 24% have more than a high school certificate equivalent level). Most of the seamen (57%) were in the merchant navy, 37% were fishermen, and 6% said that they worked in both sectors. The position which they held was significantly different according to the category of seamen ($p < 10^{-4}$). For seamen with a single field of employment, the distribution by category was: 44% owners, 44% crewmen, 7% officers, and 5% ratings for fishermen, and for merchant seamen the distribution was as follows: 43% officers, 28% ratings, 14% owners, and 15% crewmen. Seamen that reported working in both sectors were mainly crewmen (59%) and owners (30%). The majority of seamen (42%) consumed alcohol between 2 and 5 times per week, 11% every day, 38% once a week at most, and 9% never drank. Fishermen drank alcohol daily more frequently than merchant seaman (17%, 95% CI = 14–20 vs. 7%, 95% CI = 5–9; $p < 10^{-4}$). The prevalence of alcohol abuse or dependence on dichotomous DETA was 16% (95% CI = 14–18) with no significant difference according to category of seaman. Eight hundred and twenty subjects (44%, 95% CI = 42–47) were current smokers, 483 (27%, 95% CI = 25–29) were non-smokers, and 373 (20%, 95% CI = 18–22) were ex-smokers; smoking status could not be correctly determined in 171 (9%, 95% CI = 8–10). Two-thirds of the current smokers (95% CI = 59–66) were nicotine dependent

on the Fagerström test: 33% (95% CI = 29–37) showed low dependence, 22% (95% CI = 19–25) medium dependence, and 10% (95% CI = 8–12) high to very high dependence. Fishermen were significantly more likely to be current smokers (48%, 95% CI = 44–52) than were merchant seamen (41%, 95% CI = 38–44). They were also more nicotine dependent (76%, 95% CI = 71–81 vs. 53%, 95% CI = 48–58; $p < 10^{-4}$).

INTERNAL CONSISTENCY

Internal consistency was 0.68 for the 1,724 subjects responding to all four DETA items (93.3% of respondents). Having a drink first thing in the morning to steady the nerves or to get rid of a hangover was weakly bound, hardly correlating with the total score; the alpha coefficient rose to 0.74 if this variable was removed (see Table 1).

For the 744 current smokers who responded to all six FTND items (90.7% of current smokers), Cronbach’s alpha was 0.70, indicating good internal consistency among the FTND items. Correlation of each item with total score is shown in Table 1.

ALCOHOL DEPENDENCE AND NICOTINE DEPENDENCE

Alcohol dependence correlated strongly with current smoking status ($p < 10^{-4}$). Half of the alcohol dependent versus 43.3% of non-dependent subjects were current smokers. About a quarter (23.8%) of the alcohol dependent subjects were ex-smokers and 13.5% had never smoked, versus 18.9% and 29.3% of non-dependent subjects, respectively (Table 2).

Current smokers’ nicotine dependence on the FTND correlated significantly with alcohol dependence (Table 2). Ninety-seven per cent of nicotine dependent subjects (FTND score ≥ 3) were alcohol dependent, versus 13.5% of non-nicotine dependent subjects ($p = 0.03$).

For current smokers, fishermen were significantly more frequently nicotine dependent than merchant seamen (62%, 95% CI = 56–67 vs. 41%, 95% CI = 35–45; $p < 10^{-4}$). The prevalence of both alcohol dependence and nicotine dependence was comparable in the two groups (about 13%), and alcohol dependence was quite weak (about 5%). Merchant seamen had no dependence more frequently than fishermen did (41%, 95% CI = 36–46 vs. 21%, 95% CI = 16–26).

SMOKING AS A FUNCTION OF ALCOHOL DEPENDENCE

The mean FTND score for current smokers was significantly higher in those dependent on alcohol (4.2, 95% CI = 3.7–4.7 vs. 3.3, 95% CI = 3.1–3.5; $p = 0.0002$).

There were significant differences in certain FTND items with alcohol dependence (Table 3). Thirty-one per cent of alcohol dependent subjects smoked more than 20 ciga-

Table 1. Correlation of DETA questionnaire items and FTND items with total score and Cronbach's alpha coefficients for each deleted item

Items	Correlation with total score	Alpha if item deleted
DETA questionnaire items¹		
Have you felt you should cut down on your drinking?	0.57	0.54
Have people annoyed you by criticizing your drinking?	0.54	0.57
Have you felt bad or guilty about your drinking	0.62	0.51
Have you had a drink first thing in the morning to steady your nerves or to get rid of a hangover?	0.23	0.74
FTND items²		
How many cigarettes do you smoke each day?	0.52	0.62
Do you smoke more frequently during the first hours after waking than during the rest of day?	0.46	0.65
How soon after you wake up do you smoke your first cigarette?	0.62	0.59
Which cigarette would you hate to give up?	0.39	0.67
Do you smoke if you are so ill that you are in bed most of the day?	0.36	0.68
Do you find it difficult to refrain from smoking in places where it is forbidden?	0.36	0.68

¹Male subjects, n = 1724; ²male subjects, current smokers, n = 744

Table 2. Prevalence of smoking status and degree of nicotine dependence (FTND) according to alcohol dependence (male subjects)

		Current smoking status (n = 1847) ¹				FTND score for current smokers (n = 820) ²				
DETA score		Non-smoker	Ex-smoker	Current smoker	p-value	0-2	3-4	5-6	7-10 ³	p-value
0-1	n	444	303	672	< 10 ⁻⁴	227	200	130	54	0.01
	(%)	92	81	82		86	85	78	69	
	95% CI	89-95	77-85	80-85		82-91	80-90	71-85	59-80	
2-4	n	34	66	143		35	34	36	24	
	(%)	8	19	18		14	15	22	31	
	95% CI	5-11	15-23	15-20		9-18	10-20	15-29	20-41	

¹Sum of cells do not equal 1847 because of missing current smoking status and/or missing alcohol dependence status; ²sum of cells do not equal 820 because of missing FTND score (see §3.2) and/or missing alcohol dependence status; ³ the "high" and "very high dependence" categories were combined due to small sample size

rettes a day, versus 20.5% of non-alcohol dependent subjects. A higher proportion of alcohol dependent subjects smoked more frequently during the first hours after waking or soon after waking. There were no differences in the other smoking behaviour items. Alcohol dependent subjects started smoking when they were significantly younger (16.7, 95% CI = 16.1-17.3 vs. 17.3, 95% CI = 17.0-17.6; p = 0.01).

ALCOHOL CONSUMPTION AS A FUNCTION OF NICOTINE DEPENDENCE

Nicotine dependent subjects had been annoyed by people criticizing their drinking or had felt that they should cut down on their drinking more often than non-nicotine

dependent smokers (Table 4). The other DETA items showed no difference according to nicotine dependence.

Typical-day alcohol intake did not differ with nicotine dependence (55 g/day, 95% CI = 52-58 for nicotine dependent vs. 51 g/day, 95% CI = 47-55 for non-nicotine dependent; p = 0.2). Mean daily alcohol intake, on the other hand, was significantly higher in nicotine dependent subjects (22 g/day, 95% CI = 20-24 vs. 16 g/day, 95% CI = 14-18; p = 0.006). Nicotine dependent subjects significantly more often showed mean daily alcohol intakes of a level considered by the WHO to represent a health hazard. Finally, nicotine dependence correlated significantly with repeated drunkenness during the previous year.

Table 3. FTND items and smoking behaviour according to alcohol dependence (DETA score ≥ 2) for male current smokers

	DETA score						p-value
	All (n = 815) ¹		0-1 (n = 672)		2-4 (n = 143)		
	(%)	95% CI	(%)	95% CI	(%)	95% CI	
How many cigarettes do you smoke each day?#							0.02
Less than 11	30	27-34	32	28-36	23	16-30	
11-20	47	44-51	48	43-52	46	37-55	
21-30	18	15-21	17	14-20	22	15-29	
More than 30	4	3-6	3	2-4	9	4-14	
Do you smoke more frequently during the first hours after waking than during the rest of the day?#							0.01
Yes	72	69-75	74	70-78	62	54-70	
No	28	25-31	26	22-30	38	30-46	
How soon after you wake up do you smoke your first cigarette?#							0.03
Less than 5 min	9	7-11	7	5-9	15	9-21	
6-30 min	38	35-42	38	34-42	43	34-52	
31-60 min	25	22-28	26	22-29	20	13-27	
Longer than 60 min	28	25-31	29	25-33	22	15-29	
Which cigarette would you hate to give up?#							NS
The first one in the morning	50	46-54	49	45-53	53	44-62	
Another	50	46-54	51	47-55	46	38-56	
Do you smoke if you are so ill that you are in bed most of the day?#							NS
No	79	76-82	80	77-83	75	68-83	
Yes	21	18-24	20	17-23	25	17-32	
Do you find it difficult to refrain from smoking in places where it is forbidden?#							NS
No	82	79-85	83	80-86	76	69-84	
Yes	18	15-21	17	14-20	24	16-31	
Do you smoke at work?							NS
No	21	18-24	21	18-24	21	14-28	
Yes	79	76-82	79	76-82	79	72-86	
Have you tried to quit smoking?							NS
No	46	43-50	46	42-50	48	39-56	
Yes	54	50-57	54	50-58	52	44-61	
I seem to smoke							NS
More at sea than on land	47	43-50	47	43-52	44	35-53	
More on land than at sea	25	21-28	25	21-28	25	18-33	
The same at sea as on land	28	25-32	28	24-32	31	22-39	

¹Maximum number of current smokers with alcohol dependence status; the variables presented had missing data; respective total numbers may not equal 815;

#Fagerström test for nicotine dependence item; NS — non significant

Table 4. DETA questionnaire items and alcohol consumption behaviour according to FTND dependence (FTND score ≥ 3) for male current smokers

	FTND score						p-value
	All (n = 798) ¹		0-2 (n = 298)		3-10 (n = 500)		
	(%)	95% CI	(%)	95% CI	(%)	95% CI	
Have you felt you should cut down on your drinking?#							NS
No	79	76-82	81	77-86	77	73-81	
Yes	21	18-24	19	14-23	23	19-27	
Have people annoyed you by criticizing your drinking#							0.003
No	85	83-88	90	86-94	82	79-86	
Yes	15	12-17	10	6-14	18	14-21	
Have you felt bad or guilty about your drinking?#							0.05
No	77	74-80	81	76-86	75	71-79	
Yes	23	20-26	19	14-24	25	21-29	
Have you had a drink first thing in the morning to steady your nerves or to get rid of a hangover?#							n.d ²
No	99	98-100	100	99-100	98	97-99	
Yes	1	0-2	0	0-1	2	1-3	
Typical-day alcohol intake [g/day]							NS
[0-30]	30	26-34	31	25-37	29	25-34	
[30-40]	18	15-21	20	15-25	17	13-20	
[40-60]	26	22-29	27	21-33	25	21-29	
> 60	26	23-29	21	16-27	29	25-34	
Mean daily alcohol intake [g/day]							0.03
0	11	9-13	8	5-11	13	10-16	
[0-7]	15	13-18	18	13-23	13	10-16	
[5-15]	22	19-25	26	20-31	19	15-23	
[15-30]	23	20-26	22	17-27	24	20-28	
> 30	29	25-32	26	21-31	30	26-34	
WHO at-risk alcohol intake							0.03
No	84	81-87	88	84-92	82	78-85	
Yes	16	13-19	12	8-16	18	15-22	
Been drunk							0.008
Never or a long time ago	15	13-18	18	13-22	14	10-17	
More than a year ago	21	18-24	23	18-28	20	16-24	
Less than a year ago	35	32-39	38	32-44	33	29-38	
Several times in the last year	29	25-32	21	16-26	33	28-37	
Alcohol intake seems							NS
More at sea than on land	3	02-03	3	1-5	2	1-4	
More on land than at sea	70	67-74	66	60-72	73	69-77	
Same at sea as on land	27	24-30	31	25-37	25	21-29	

¹Maximum number of current smokers with nicotine dependence status; the variables presented had missing data; respective total numbers may not equal 798; ²n.d = χ^2 not determinable as > 25% of cells had expected frequencies of < 5; #DETA questionnaire item; NS – non significant

OCCUPATIONAL DEPENDENCE

For fishermen, mean voyage time was significantly associated with nicotine dependence (12 days, 95% CI = 9–14 for nicotine dependent vs. 7 days, 95% CI = 4–9 for non-nicotine dependent; $p < 10^{-4}$). The number of days spent at sea during the past 12 months was significantly associated with nicotine dependence (205 days, 95% CI = 193–217 for nicotine dependent vs. 177 days, 95% CI = 158–195 for non-nicotine dependent; $p < 10^{-4}$). Position held was independent of alcohol dependence or nicotine dependence (Table 5).

For merchant seamen, there were no significant differences in mean voyage time and the number of days spent at sea during the past 12 months, according to alcohol dependence and nicotine dependence. Position held was independent of alcohol dependence or nicotine dependence (Table 6).

DISCUSSION

The present study is the first in France to estimate nicotine and alcohol abuse or dependence in seamen. The strong

positive correlation between the two dependences is an important finding for future preventative policymaking.

STUDY LIMITATIONS

The non-compliance rate, in terms of total or partial failure to complete the questionnaire, was 4.7%, mainly on the part of young fishermen from a single port (results not shown). The prevalence of dependence may thus have been underestimated, as fishermen are more affected by issues of dependence and high alcohol and nicotine consumption. Even so, the non-compliance rate was low, and any underestimation can be presumed to be slight.

Stratifying the survey over 19 ports in France made recruitment representative of the population of French seamen. Types of seafaring job vary geographically, and local variations in alcohol consumption have also been demonstrated in the general French population [14]. The survey plan enabled such disparities to be taken into account.

The study deals with consumption at home and on-board. No information could evaluate “work consumption”.

Table 5. Alcohol and nicotine dependence according to work environment for male fishermen

	DETA score				p-value	FTND score on current smoker				p-value
	0-1		2-4			0-2		3-10		
	(%)	95% CI	(%)	95% CI		(%)	95% CI	(%)	95% CI	
Position					NS					NS
Officer	7	5-9	9	3-15		5	0-10	8	4-11	
Rating	5	3-7	3	0-6		4	0-8	6	3-9	
Owner	45	41-49	37	26-46		44	33-56	30	24-36	
Crewman	43	39-47	51	41-61		47	35-58	56	50-62	
Mean voyage time (in days)					NS					0.009
Mean (95% CI)	11 (9-13)		9 (7-11)			7 (4-9)		12 (9-14)		
Number of days spent at sea during the past 12 months					0.04					0.02
Mean (95% CI)	195 (188-202)		212 (192-231)			177 (158-195)		205 (193-217)		
Alcohol intake seems					NS					
More at sea than on land	2	1-3	3	0-7						
More on land than at sea	77	73-81	82	74-90						
Same at sea as on land	21	18-25	15	7-22						
Smoking seems										0.002
More at sea than on land						26	15-35	49	42-55	
More on land than at sea						38	27-49	25	19-31	
Same at sea as on land						36	24-48	26	20-32	

NS – non significant

Table 6. Alcohol and nicotine dependence according to work environment for male merchant seamen

	DETA score				p-value	FTND score on current smoker				p-value
	0–1		2–4			0–2		3–10		
	(%)	95% CI	(%)	95% CI		(%)	95% CI	(%)	95% CI	
Position					NS					NS
Officer	44	41–47	38	30–46		40	33–47	31	25–38	
Rating	28	25–31	31	23–38		28	22–35	33	26–39	
Owner	13	11–15	18	12–24		15	10–21	13	8–17	
Crewman	15	12–17	13	8–18		17	11–22	23	17–29	
Mean voyage time (in days)					NS					NS
Mean (95% CI)	28 (25–30)		24 (19–29)			30 (24–36)		27 (22–32)		
Number of days spent at sea during the past 12 months					NS					0.05
Mean (95% CI)	154 (149–159)		142 (131–153)			145 (134–156)		159 (149–169)		
Alcohol intake seems					0.005					
More at sea than on land	4	2–5	7	3–11						
More on land than at sea	60	56–64	70	62–78						
Same at sea as on land	36	32–40	23	16–30						
Smoking seems										NS
More at sea than on land						56	48–64	51	44–58	
More on land than at sea						21	14–27	15	10–20	
Same at sea as on land						23	17–30	34	27–41	

NS – non significant

Two thirds of seamen declared alcohol consumption to be more important on land than at sea, whereas 47% of current smokers declared their tobacco consumption to be more at sea than on land.

ASSESSMENT TOOLS

Dependence is often a difficult issue to study: it bears a heavy social connotation and may vary according to the substance involved and time. Assessment of physical and psychological dependence thus requires standardized tests.

The French version (DETA) of the CAGE questionnaire, used to assess the prevalence of alcohol dependence, has undergone validation [15]. CAGE is a recognized assessment tool [18] and it is often used in international studies [19]. The internal consistency of the DETA questionnaire was comparable to findings in the literature. The low correlation of the question “Have you had a drink first thing in the morning to steady your nerves or to get rid of a hang-over?” with the total score has been previously reported [15]. This is the only item of CAGE which is related to alcohol dependence symptoms: the CAGE questionnaire in our study should be considered more than a screening test of

alcohol abuse or dependence than a diagnosed test of alcohol dependence. CAGE’s screening sensitivity for alcohol dependent subjects has been called into question in a sample drawn from the general population [3]. Trends in alcohol consumption and dependence are contrasting: the former is decreasing while the latter is increasing [3]. CAGE may underestimate alcohol dependence when administered after questions regarding frequency and quantity of consumption [20]. Any such bias would not seem greatly to affect the present study, given the strong correlations found between various consumption variables and DETA score. The latter’s good specificity and sensitivity and ease of administration (only 4 items) make it a useful tool for screening for alcohol abuse or dependence [15].

The Fagerström Test for Nicotine Dependence exists in a validated French version [17]. The FTND questionnaire internal consistency, at 0.70 for male respondents, was comparable to reports in the literature [17, 21]. Although widely used, the test has been criticized for its predominant correlation between total score and item regarding the number of cigarettes smoked per day. In the present study, the latter item did not seem to be more important

than the others in calculating the total score. The item asking "How soon after you wake up do you smoke your first cigarette?" was more strongly bound, and the item regarding smoking more frequently during the first hours after waking was closely correlated to that quantifying the number of cigarettes smoked per day. The Fagerström test is unaffected by how long the subject has been a smoker. One admitted limitation of the Fagerström test is its failure to explore all of the dimensions that the DSM-IV defines as dependence criteria [22]. It measures physical dependence on nicotine and failure to stop smoking, smoking more than wished, for longer than wished, and despite negative consequences, but does not assess withdrawal symptoms. Some of these variables were added to the questionnaire and were reported in the Results section. The ability of the FTND to predict success in stopping smoking is a matter of discussion in the literature: studies defending the test point to the weakness of association between dependence on the FTND and cessation of smoking [23]. More than half of ex-smokers in the present study (129/234) were nicotine dependent according to the FTND. The FTND remains the standard test in international studies assessing the degree of nicotine dependence in smokers [24], and it is quick to administer.

RESULTS

Alcohol abuse or dependence was significantly associated with nicotine dependence: the proportion of alcohol abusers and dependent subjects increased with the degree of nicotine dependence. There was a significant difference in mean daily alcohol intake according to nicotine dependence in current smokers, and likewise for repeated drunkenness during the previous year. Twelve per cent of the current smokers showed double nicotine/alcohol dependence.

These findings are in line with current addiction theory, according to which, addiction to one drug increases the probability of co-addiction to a second drug [13]. It is thus predicted that smokers with a drink problem are more likely to be nicotine dependent [25]. A recent review of the literature [13] found a correlation between alcohol dependence and nicotine dependence in most of the studies reviewed. Moreover, nicotine intake in occasional smokers increased their alcohol consumption, as compared to consumption of nicotine-free placebo cigarettes [26]. Only a few Fagerström test variables differed significantly according to alcohol dependence: there was no difference in terms of attempts to stop smoking or smoking while at work. However, a German study found an association between alcohol dependence and the age at which subjects began smoking [10]; the present study confirms this finding. Moreover, nicotine dependent subjects showed significantly greater

mean daily alcohol intake and more frequent drunkenness during the previous year.

The smoking prevalence found in the present study was comparable to that reported for Scotland (40%) [4]. French seamen smoked less than Spanish seamen (between 47% and 80%, according to the study) [5, 6, 7] or Polish seamen (72.9% of fishermen and 59.7% of merchant seamen) [8]. To the best of our knowledge, there are no studies of nicotine dependence in seamen.

In 1990, the prevalence of alcohol dependence in Polish seamen was estimated at 5% [9]. In the present study, alcohol dependence in the DETA test was 15.6% in male respondents.

Various explanations for the association between alcohol dependence and nicotine dependence in smokers have been put forward, including neurobiological effects causing alcohol to increase the effect of nicotine or vice versa [13].

While a genetic predisposition to alcohol and/or nicotine dependence has been found [27], its importance relative to environmental factors remains to be determined. Among environmental factors, the work environment is worth examining. The prevalence of dependence may be due to the characteristics of seamen as a professional group: mainly young men in a work environment in which dependence is traditionally frequent. The links between nicotine dependence and alcohol dependence in seamen may also be behavioural in nature, with possible peer group pressure.

In the seafaring world, the work environment seems to be a determining factor in dependence [28]. The fisherman's job is one of the toughest and most dangerous there is. The work accident rate is significantly higher than it is for other jobs, especially in terms of mortality [29]. In the Gazel cohort of French electricity and gas workers, employees' alcohol consumption was found to rise under the most stressful work-environmental conditions [30]. French seagoing work regulations specify a maximum amount of alcoholic drink for meals on board (article 76 of work maritime Code, *De la nourriture et du couchage*). This is thus one of the few work situations in which drinking on the job is allowed — in theory, during mealtimes. Perceived work strain correlated with nicotine dependence in a community sample [31]. Duty-free sales on board probably contribute to heavier smoking at sea. French tax regulations exonerate sales from value added tax to boats involved in industrial activity on the high seas, in professional sea fishing, and in sea assistance and rescue (article 262 of the General Tax Code, *Taxe sur la valeur ajoutée*). For nicotine dependent seamen who smoked more at sea than on land, mean voyage time was significantly greater than for dependent seamen who smoked more on land than at sea (20 days, 95% CI = 16–24 vs. 11 days, 95% CI = 7–15; $p < 0.001$). Prece-

dent analysis has shown that alcohol or tobacco consumption are significantly different according to the category of seamen [32]. Work conditions and environment are different in these two categories and may contribute to the different use of alcohol and tobacco. Prevention policy should reflect these differences.

CONCLUSIONS

French fishermen and merchant seamen are markedly subject to alcohol and cigarette consumption. Co-consumption may induce co-dependence. The relationships found between alcohol abuse or dependence and nicotine dependence, and the drinking behaviour of dependent smokers and, to a lesser degree, the smoking behaviour of alcohol dependent seamen, point to the need for simultaneous prevention. The findings presented are original and will be used to formulate the health promotion programme for French maritime workers.

ACKNOWLEDGEMENTS

The authors would like to thank the occupational physicians and nurses of the Occupational Health Department for their participation in the collection of data for this survey.

Funding for this study was provided by the Occupational Maritime Health Department (Service de santé des gens de mer) as well as the study design and data collection.

It had no further role in the analysis and interpretation of data or in the decision to submit the paper for publication.

CONFLICT OF INTEREST

All authors declare that they have no conflicts of interest

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