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Cardiovascular Diseases Risk Factors in oil and gas workers: a ten years observational retrospective cohort

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Key words: Oil and gas workers, cardiovascular disease, cohort study, dyslipidemia
Parole chiave: Lavoratori Oil e Gas, malattie cardiovascolari, studio di coorte, dislipidemia

Abstract

Objectives. *The study aim was to examine the trend of major clinical biochemistry factors associated with cardiovascular diseases and dyslipidemia onset over a 10-year period (2000-2010) in Oil and Gas workers.*
Methods. *The information extracted from "Computerized management of individual medical services database" regarding 439 Italian workers of an oil and gas company were analysed.*
Results. A constant and significant increase of the average Body Mass Index and serum cholesterol were found, and in particular in workers < 36 years: BMI was 24.4 (2000) and 25.8 (2010) with p < 0.001, and cholesterol was 188.3 mg/dL (2000) and 206.5 mg/dL (2010) with p < 0.001.
Conclusions. *Analysed variables are the most important risk factor for cardiovascular, neurological and neoplastic diseases, as well as they reduce life expectancy. Occupational medicine in particular in extreme working environmental conditions, such as for workers in oil and gas companies, monitoring health status and promoting healthy life style, has a strategic role to perform cost-effective strategies to reduce health risks, thus improving the workers lifestyle.*

Introduction

Workplace health promotion is a strategy that has to consider the synergistic effects of occupational hazards and lifestyle on human health. It is well known that the working conditions affect the general health of workers (for example, a sedentary work can promote obesity); as well as personal habits, attitudes and lifestyle choices influence health and wellness, also, affecting job performance (1).

Recent studies have shown that in the professional field the lower energy consumption, associated with the increasingly widespread mechanization and robotization of heavier work, is a significant causal factor in determining an increase in body weight (2, 3). In addition, stressful jobs characterized by long shifts and night cycles can induce biological imbalances, such as lipid metabolism, favouring a prevalence of obesity, thus increasing the risk of accidents and injuries at work (3, 4).

In this context it is essential to monitor workers' health status, in order to plan and implement appropriate interventions to encourage healthy behaviours.

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This study analyzed the main clinical risk factors (Body Mass Index, hypertension, dyslipidemia, glycemia) linked to the cardiovascular diseases onset, whereas these are a leading cause of morbidity and mortality worldwide (5,6) and hypertension and dyslipidemia are two of the major well known risk factors for cardiovascular diseases (CVD) (5, 7, 8). A specific population of workers dedicated to oil and gas activities in remote areas and deep-water was studied. This type of professionals are little studied in the literature although widespread (9-11). The activities, together with behavioural and socialization models used by these workers, could contribute to the increase of the main cardiovascular risk factors listed above. The employees were engaged in heavy work shifts (12 hours), with availability 24 hours, night shifts, sometimes live in extreme environments (offshore, in remote regions) and away from family life (4, 12).

In this context, the meal is a reason of conviviality and social relationship: food type and availability, associated to physical inactivity, can lead the employee to have a high caloric intake, not justified by energy consumption (4); furthermore, diets are often rich in fat, poor in fiber and do not respect the proper nutritional requirements necessary to workers (4). Some studies show how the majority of people working in the petrochemical industry is overweight or obese and have an increased cardiovascular risk and these problems affect worker quality of life and productivity (13-16).

Something similar has been found on employees cholesterol levels. Studies have demonstrated employees with cholesterol levels greater than 220 mg/dL spent 11% more time absent from work; while there are no significant differences between employees normo- and hypertensive (13, 17). Finally, some articles have shown a directly proportional relationship between the number of risk factors for employees and absenteeism (13, 17).

In this context, the present study describes the major clinical biochemistry factors, such as cholesterol, hypertension, fasting glucose, BMI and triglycerides associated with cardiovascular diseases and dyslipidemia onset over a 10-year period in a sample of oil and gas workers.

Methods

An observational retrospective cohort study was carried out. The STROBE statement was followed to conduct the research (18).

Study population

The study included Italian workers in an oil and gas company subjected to three occupational medical examinations in 10 years (2000-2010) with a mean follow-up of five years (2000-2005-2010).

Data collection

The information about workers were extracted from a Computerized Management of Individual Medical Services Database. This is an health management system utilized to collect the medical records for each worker and to follow his health during the employment. The software is not born to epidemiological analysis, and for this reason for instance it did not allow us to fill in some gaps such as information on HDL cholesterol or tobacco consumption and to control possible bias such as working role or how many activities were performed. Whenever possible, efforts have been made to address potential sources of bias.

The variables available and analyzed in this study were as follows:

• Body Mass Index (BMI): a score equal to or greater than 25 indicates overweight, while values greater than or equal to 30 obesity (19);

• Hypertension, diagnosed when systolic blood pressure (SBP) was ≥ 140 mmHg and/

or diastolic blood pressure (DBP) was ≥ 90 mmHg (20);

• Fasting glucose (FG): ≤ 110 mg/dL healthy level; 111-125 mg/dL impaired fasting glucose (IFG); ≥ 126 mg/dL high level (21). According to ESC/EASD, 2007, guidelines, it is possible to diagnose diabetes if measured fasting glucose is > 126 mg/dL twice in a row, if it is > 200 mg/dL in a random measure or after 120' since the administration of an oral glucose tolerance test (OGTT).

• Cholesterol (CHO): < 200 mg/dL healthy level; 200 - 239 mg/dL borderline; ≥ 240 mg/dL high level (22);

• Triglicerydes (TRI): < 150 mg/dL optimal level; ≥ 150 mg/dL high level (23).

The guidelines used to classify BMI, hypertension, FG, CHO and TRI were those considered in the studied period.

Variables were analyzed stratifying by age: they were organized into three groups (< 36 years, 36-45 years, > 45 years).

A Risk Factor Score (RF Score), obtained by the sum of the five risk factors analyzed, was defined to assess the possible variation during the study period (Range: 0-5).

Missing data were those not reported by the medical staff on the "Computerized management of individual medical services database" system being updated. None of the included workers was medically treated for the above mentioned risk factors.

Statistical analysis

Statistical analysis comprised descriptive and inference methods. Arithmetic mean and standard deviation (SD) were calculated for continuous variables.

Percentage and frequencies were presented to describe the qualitative information.

The linear diagram was realized to describe the trend for BMI, blood pressure (BP), FG, CHO, TRI and for the number of risk factors stratified by age groups.

The chi-square test was used in order to evaluate possible associations between age groups and health qualitative characteristics.

The repeated measures multivariate analysis of variance (MANOVA using Pillai's trace) was used to assess the possible variation of the parameters during the observational period, and the means with relative 95% confidence intervals (95% CI) were computed. Prior to MANOVA, homogeneity of error variances was tested with the Mauchly's test for sphericity in order to validly interpret the results. Therefore, in case of significant results ($p < 0.05$) of the Mauchly's test and thus violation of homogeneity of error variances, a Lower Bound correction was applied.

The SPSS 21.0 software was used for the statistical analysis.

The statistical significance was set at p-value < 0.05.

Results

The sample dataset included 439 Italian males workers that had a mean age of 42 years (SD = 7.6) at the beginning of the study. The population is composed of 46.3% middle school graduated, 37.6 % high school graduated and 16.1 % university graduated.

The BMI trend analysis showed a significant increase in measured values (26.5 - 2000; 27.4 - 2010, $p < 0.001$; Table 1) in 10 years. Specifically, overweight workers were kept around 57%, while obese workers significantly increased (11 % - 2000; 19% - 2010, $p = 0.007$; Table 2).

The analysis carried out by age group (Figure 1) emphasized a constant and significant increase of the average BMI for workers < 36 years (24.4 - 2000; 25.8 - 2010, $p < 0.001$), for workers 36 - 45 years (26.5 - 2000; 27.3 - 2010, $p < 0.001$) and for workers > 45 years (27.7 - 2000; 28.2 - 2010, $p = 0.006$). The average BMI measured in 2010 was indicative of an overweight condition for workers in all age groups analyzed.

Workers < 36 years had a significant percentage increase of overweight (38%

- 2000; 54% - 2010) and obesity (1% - 2000; 6% - 2010) in 10 years, p = 0.03. Moreover, the other workers showed an increase of obesity percentage, while a decrease of overweight was observed, but data were not significant (Table 3). However, it is important to emphasize that regardless of age, more than half of the population during the observational period presented BMI values equivalent to an overweight condition.

The blood pressure trend analysis underlined a decrease in the average systolic (130.4 mm Hg - 2000; 128.8 mmHg - 2010, p = 0.1) and diastolic (80.9 mm Hg - 2000; 80.0 mmHg - 2010, p = 0.04) blood pressure in ten years, which remained within the limits of normality (Table 1). Data indicate a reduction of worker's hypertension, that was down from 35% in 2000 to 30% in 2010, even if the differences were not significant, p = 0.2 (Table 2).

The study by age group confirmed what was shown for the general population. We noted that the average SBP significantly decreased in workers < 36 years (125.6 mmHg - 2000; 122.6 mmHg - 2010, p < 0.001) and > 45 years (135.9 mmHg - 2000; 132.2 mmHg - 2010, p = 0.02; Figure1). While, DBP significantly decreased just in workers > 45 years (84.1 mmHg - 2000; 81.8 mmHg - 2010, p = 0.009; Figure 1).

Hypertension decreased in workers < 36 years (21%-2000; 14%-2010) and > 45 years (52-2000; 41%-2010), while was kept around 29% in workers 36 - 45 years (Table 3).

The fasting glucose trend showed a significant increase in the average measured values (93.3 mg/dL - 2000; 96.0 mg/dL - 2010, p < 0.001; Table 1), even it within under healthy limits. Diabetes rate found in the population was kept constant at about 2% but the percentage of workers with values related to a condition of impaired fasting glucose (IFG), increased from 5% in 2000 to 10% in 2010 (Table 2).

The study by age group (Figure 1) confirmed a significant increase of the average FG values in workers 36 - 45 years (93.3 mg/dL - 2000; 95.3 mg/dL - 2010, p = 0.03) and > 45 years (97.6 mg/dL - 2000; 100.1 mg/dL - 2010, p = 0.006). In workers > 45 years, we also found an increase, even if not significant, in the percentage of FG values related to IFG (7 % - 2000; 16% - 2010, p = 0.07) and in diabetes (3% - 2000; 6% - 2010, p = 0.07). However, this age group showed the highest percentage of pathological values measured (Table 3).

The cholesterol trend analysis underlined that workers population presented average

Table 1 - Variables distribution in workers' population during the observational period (2000, 2005 and 2010).

Variables	Year									P
	2000			2005			2010			
	Mean	CI95% Lower	CI95% Upper	Mean	CI95% Lower	CI95% Upper	Mean	CI95% Lower	CI95% Upper	
BMI	26.5	26.2	26.8	27.0	26.7	27.3	27.4	27	27.7	< 0.001*
BSP	130.4	129.2	131.7	129.6	128.5	130.8	128.8	127.6	129.9	0.1*
BDP	80.9	80.1	81.6	81.3	80.6	82.0	80.0	79.3	80.7	0.04*
FG	93.3	92.1	94.5	96.3	94.9	97.7	96.0	94.6	97.5	< 0.001*
CHO	214.8	210.2	219.3	204.3	200.0	208.5	210.2	206.5	213.9	< 0.001°
TRI	142.3	133.8	150.8	146.8	138.6	155	136.5	129.7	143.3	0.1*

° p-value of Pillai's trace.

* the sfericity test was < 0.05 and than Lower-bound test was considered.

Table 2 - Percentage variables trend analysis 2000 - 2010.

Variables		Year 2000 N (%)	Year 2005 N (%)	Year 2010 N (%)	p*
BMI	Normal (< 25)	126 (32)	112 (27)	104 (24)	0.007
	Overweight (25 - 29.9)	227 (57)	229 (56)	249 (57)	
	Obese (≥ 30)	45 (11)	70 (17)	86 (19)	
Hypertension	No (< 140 mm Hg and/or < 90 mm Hg)	278 (65)	289 (66)	307 (70)	0.200
	Yes (> 140 mm Hg and/or > 90 mm Hg)	152 (35)	148 (34)	132 (30)	
Fasting Glucose	Normal (< 110 mg/dL)	405 (93)	396 (91)	383 (88)	0.050
	IFG (111 - 125 mg/dL)	21 (5)	27 (6)	43 (10)	
	High (> 126 mg/dL)	9 (2)	12 (4)	11 (2)	
Cholesterol	Normal (< 200 mg/dL)	166 (39)	209 (48)	166 (38)	< 0.001
	Borderline (200 - 239 mg/dL)	134 (31)	144 (33)	172 (39)	
	High (> 240 mg/dL)	127 (30)	85 (19)	101 (23)	
Triglicerydes	Normal (< 150 mg/dL)	284 (67)	278 (64)	303 (69)	0.300
	High (> 150 mg/dL)	140 (33)	155 (36)	135 (31)	

*: p-value obtained by χ^2 test
Bold: significance, p < 0.05.

values of serum cholesterol higher than the normal range (< 200 mg / dL), in the whole observation period (214.8 mg/dL - 2000; 210.2 mg/dL - 2010, p < 0.001; Table 1). During 10 years, it was observed a significant percentage increase of workers with borderline cholesterol values (31% - 2000; 39% - 2010, p < 0.001) and a reduction of those with hypercholesterolemia problems (30 %- 2000; 23 %- 2010, p < 0.001), which, however, was found in more than 20% of the population (Table 2). The analysis by age group (Figure 1) showed a significant increase of the mean values of serum cholesterol in workers <36 years (188.3 mg/dL - 2000; 206.5 mg/dL - 2010, p < 0.001), that passed from normal to borderline values, compared to the significant decrease in serum cholesterol in workers > 45 years (228.4 mg/dL - 2000; 211.4 mg/dL - 2010, p < 0.001). These data were in agreement with the significant increase of the percentage of workers borderline aged <

36 years (29%- 2000; 37% - 2010, $p = 0.01$) and > 45 years (33% - 2000; 43%- 2010, $p = 0.002$), and with the fluctuations in hypercholesterolemia, that after ten years was around 20% in both age groups (Table 3).

The trend analysis of triglicerydes showed no significant change in average values, which were within the normal range (< 150 mg/dL) during the observational period (Table 1). The percentage of the population with high triglicerydes problems was approximately the 30% (Table 2). Specifically, it was found a significant increase in average triglicerydes values in workers < 36 years (99.7 mg/dL - 2000; 136.6 mg/dL - 2010, $p < 0.001$), while in the older ones triglicerydes levels decreased; although so, workers > 45 years retained average values of triglicerydes higher than the normal range. The percentage of workers with high triglicerydes problems, reported in Table 3, reflected what we described above; in particular stressing the significant increase found in workers aged < 36 years (12% - 2000; 35% - 2010, $p = 0.001$).

The analysis of the RF Score was possible just on 359 workers. It showed that during the period of investigation no significant variations were found. In Table 4 the percentages of the workers who had or not risk factors was almost unchanged during ten years.

Analyzing the difference (Δ) between the number of the risk factors at the beginning or in the middle period of the study with those at the end, the percentage of the workers that improved or maintained their healthy condition remained the same (78% and 77%) (Table 5).

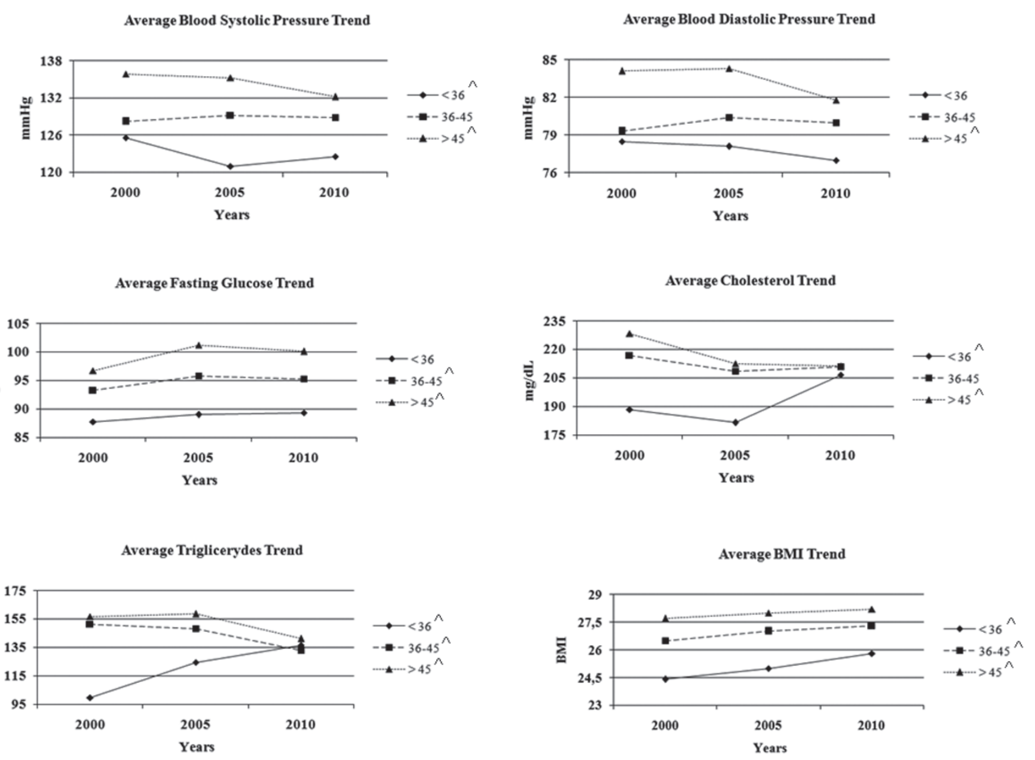

Figure 1 - Average Blood Systolic and Diastolic Pressure, Fasting Glucose, Cholesterol, Triglycerides and BMI, trends 2000 - 2010.
^: Age groups for which the variation is statistically significant in the period ($p < 0.05$).

Discussion

The study clearly described changes in workers metabolic parameters analyzed during the time. In 10 years, the average BMI value in the general population showed a 1% increase (26.5% -2000; 27.4% - 2010); moreover, more than 55% of workers were overweight, while obesity doubled , from 10% in 2000 to 19% in 2010. Our data are consistent with the work of Perbellini et al. (3), dealing with other Italian workers categories; in particular, oil & gas workers present a BMI trend which is similar to that of drivers, a category which performs purely sedentary work. In addition, our data describe the same overweight and obesity conditions observed in previous studies by Fenn, Østgård and Oshaug on other oil & gas workers populations (24-26).

Table 3 - Age groups percentage variables trend analysis 2000 - 2010.

Variables		Age Groups											
		< 36 N (%)				36 - 45 N (%)				> 45 N (%)			
		2000	2005	2010	p*	2000	2005	2010	p*	2000	2005	2010	p*
BMI	Normal	51 (61)	41 (47)	37 (40)		52 (31)	49 (29)	47 (25)		23 (16)	22 (15)	20 (13)	
	Overweight	32 (38)	44 (51)	51 (54)	**0.03**	101 (59)	92 (52)	105 (55)	0.1	94 (65)	93 (62)	93 (60)	0.5
	Obese	1 (1)	2 (2)	6 (6)		17 (10)	33 (19)	37 (20)		27 (19)	35 (23)	43 (27)	
Hypertension	No	71 (79)	79 (85)	81 (86)	0.4	132 (71)	133 (70)	134 (71)	0.1	75 (48)	77 (50)	92 (59)	0.1
	Yes	19 (21)	14 (15)	13 (14)		53 (29)	56 (30)	55 (29)		80 (52)	78 (50)	64 (41)	
Fasting Glucose	Normal	91 (98)	91 (100)	92 (98)		175 (94)	174 (92)	169 (90)		139 (90)	131 (85)	122 (78)	
	IFG	2 (2)	0 (0)	1 (1)	n.c.	8 (4)	12 (6)	17 (9)	0.4	11 (7)	15 (10)	25 (16)	0.07
	High	0 (0)	0 (0)	0 (1)		4 (2)	3 (2)	2 (1)		5 (3)	9 (5)	9 (6)	
Cholesterol	Normal	57 (61)	66 (70)	43 (46)		70 (39)	84 (45)	71 (38)		39 (26)	59 (38)	52 (33)	
	Borderline	27 (29)	20 (21)	35 (37)	**0.01**	56 (31)	63 (33)	70 (37)	0.3	51 (33)	61 (39)	67 (43)	**0.002**
	High	9 (10)	8 (9)	16 (17)		55 (30)	42 (22)	48 (25)		63 (41)	35 (23)	37 (24)	
Triglicerydes	Normal	80 (88)	71 (76)	60 (65)	**0.001**	110 (61)	119 (64)	139 (74)	**0.03**	94 (61)	88 (57)	104 (67)	0.2
	High	11 (12)	22 (24)	33 (35)		70 (39)	67 (36)	50 (26)		59 (39)	66 (43)	52 (33)	

n.c.: Not computable.
*: P-value obtained by χ^2 test
Bold: significance, $p < 0.05$.

Table 4 - Risk factors score (RFS) distribution in the follow-up.

Risk factors score (N. of risk factors)	2000		2005		2010	
	N	%	N	%	N	%
0	164	46	168	47	159	44
1	121	34	117	33	132	37
2	65	18	61	17	57	16
3	9	2	13	3	11	3
4	0	0	0	0	0	0
5	0	0	0	0	0	0
Total	359	100	359	100	359	100

In the observation period, workers < 36 years showed a significant increase in overweight rate, from 38% to 54% and in obesity rate, from 1% to 6%; in older ones, instead, overweight rate was about 50% in workers 45-54 years and 60% in workers > 45 years, while obesity rate was about 16% and 23%, respectively. Finally, we showed an inverse relationship, although not significant, between workers education level and overweight and obesity, as already highlighted by Paker in 2003 (4). Data demonstrated unhealthy and probably quantitatively unbalanced food habits, associated with low physical activity, that workers put into practice since the beginning of their worklife and did not correct over time.

Hypertension data, although not significant, describe a general population that during ten years has 30% of workers suffering from hypertension, varying from 20% in the youngest (< 36 years) and 40% in the elderly (> 45 years); this result is in agreement with those reported by Rosenthal and Mc Carthy, who pointed out how chronic stress has been acknowledged as a credible cause of high blood pressure (27, 28) or job strain, resulting from a lack of balance between job demands and job control, is considered one of the frequent factors in the etiology of hypertension in modern society. Stress, with its multifactorial causes, is complex and difficult to analyze at the physiological and psychosocial levels. The possible relation between job strain and blood pressure levels has been extensively studied, but the literature is replete with conflicting results regarding the relationship between the two. Further analysis of this relationship, including the many facets of job strain, may lead to operative proposals at the individual and public health levels designed to reduce the effects on health and well-being. In this article, we review the literature on the subject, discussing the various methodologies, confounding variables, and suggested approaches for a healthier work environment.

During ten years, the average cholesterol value in the general population was slightly reduced (214.8 mg/dL - 2000; 210.2 mg/dL - 2010), but was still over the optimal value of 200 mg/dL. In workers < 36 years the percentage of high cholesterol population doubled in ten years from 10% to 17%, while it varies between 20% and 30% in workers 45-54 years, and is up to 41% in eldest group (> 45 years). In about 30% of the general population we found also a high average triglycerides value (> 150 mg/dL). During ten years, the increase was greater for younger people who showed an increase of high triglycerides rate from 12% to 35%; 45-54 year-old workers showed a slight decrease in bloody triglycerides value rate from 39% to 26%, while the elders had rates higher than 30%.

An important finding emerging is that workers, probably, underestimated risks from unhealthy eating habits associated with low physical activity and the type of work performed. In fact, the analysis showed that obesity and dyslipidemia problems rapidly increased in younger workers, while in the older, probably due to the onset of other health problems, there were a static situation or a slight improvement.

Our reflections appear to be supported also by the Risk Factor Score confirming that CHD risk was not changed during the whole study period (10 years).

Furthermore, it is known that analyzed variables are the most important risk factor not only for cardiovascular diseases and strokes, but more generally, they reduce life expectancy and expose to a greater risk of neoplastic diseases (29). In terms of employers' interests, obese workers take more sick days and have longer sick leaves (increased absenteeism), incur greater productivity losses (increased pre-absenteeism), and raise more expensive compensation claims than not obese workers do (30).

In this context, the occupational medicine plays a key role. During periodic employability checks occupational doctors could provide advice to the employees to improve their lifestyle to reduce the risk of cardiovascular disease. In addition, companies may promote the development of canteens that are able to provide personalized diets (celiac disease, low sodium); ensure the possibility of consulting specialists (nutritionists / dieticians) at work or on line

Table 5 - Risk Factors Score (RFS) variability during the follow-up.

RFS	Δ 2010-2000			Δ 2010-2005		
	N	%	Cumula-tive %	N	%	Cumula-tive %
-2 (reduction of 2 risk factors)	17	5	5	15	4	4
-1 (reduction of 1 risk factor)	70	20	25	68	19	23
0 (no variation)	189	53	78	194	54	77
1 (increase of 1 risk factor)	64	18	96	67	19	96
2 (increase of 2 risk factors)	16	4	100	13	4	100
3 (increase of 3 risk factors)	3	0.7	100	2	0.6	100
4 (increase of 4 risk factors)	0	0.8	100	0	0	100
5 (increase of 5 risk factors)	0	0	100	0	0	100
Total	359	100.0	100	359	100.0	100

Δ 2010-2000: difference between RF Scores→ RF Score 2010 - RF Score 2000.
Δ 2010-2005: difference between RF Scores → RF Score 2010 - RF Score 2005.

(offshore) and encourage physical activity as a way to meet and socialize.

However, the study presents some limitations. The Computerized Management of Individual Medical Services Database system is designed for employability checks and not to collect epidemiological information such as, for example, HDL and LDL cholesterol values. Moreover, the BMI value is not an accurate method to measure the obesity. The waist circumference, triceps and subscapular skinfolds should be used to study the body composition and body fat assessment. Moreover, the clinical analysis should be carried out in a single structure or in multiple structures with standardized protocols. Finally, smoking status was self-referred and it was not possible to correlate the job performed by workers with the risk of developing cardiovascular disease and dyslipidemia.

Notwithstanding these limitations, the strengths of the study are described in the long follow-up period considered (10 years), the sample size and the systematic collection of data by qualified health personnel.

This study reports useful information to know the health of a population of workers still little studied in order to promote constant monitoring as a cost-effective preventing means for cardiovascular disease and dyslipidemia (25).

Riassunto

Fattori di rischio cardiovascolare in lavoratori settore dell'Oil & Gas: studio di coorte retrospettivo a dieci anni

Obiettivo. L'obiettivo dello studio è valutare il trend dei principali fattori biochimici associati a rischio di malattie cardiovascolare in un periodo di 10 anni in un campione di lavoratori nel settore Oil e Gas.

Metodi. Attraverso un sistema di gestione dei dati sanitari dei lavoratori è stato possibile raccogliere informazioni di 439 lavoratori italiani in un arco di tempo che va dal 2000 al 2010.

Risultati. Significativi incrementi dei valori medi sono stati riscontrati nel periodo in studio relativamente a BMI e colesterolo totale ed in particolare nella fascia di età < 36 anni: BMI 24.4 (2000) 25.8 (2010) con $p < 0.001$, colesterolo 188.3 mg/dL (2000) e 206.5 mg/dL (2010) con $p < 0.001$.

Conclusioni. Le variabili analizzate risultano essere tra quelle maggiormente note come associate a rischio cardiovascolare. In particolari contesti lavorativi dove le condizioni ambientali possono esser estreme, come nel caso delle compagnie del settore Gas e Oil, la medicina occupazione che monitora lo stato di salute e promuove stili di vita salubri, svolge un ruolo strategico per proporre una prevenzione efficace sia nel ridurre i fattori di rischio che nel migliorare gli stili di vita dei lavoratori.

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