Ahead of Print
Turk Thorac J
DOI: 10.5152/TurkThoracJ.2017.17055

Original Article

Occupational Risk Factors and the Relationship of Smoking with Anxiety and Depression

Dilek Ergün[1], Recai Ergün[2], Begüm Ergan[3], Özlem Kar Kurt[4]

[1]Department of Chest Diseases, Ankara Occupational Diseases Hospital, Ankara, Turkey
[2]Department of Chest Diseases, Dışkapı Yıldırım Beyazıt Training and Research Hospital, University of Health Sciences, Ankara, Turkey
[3]Department of Chest Deseases, Dokuz Eylül University School of Medicine, İzmir, Turkey
[4]Division of Occupational Medicine, Department of Chest Diseases, Hacettepe University School of Medicine, Ankara, Turkey

Cite this article as: Ergün D, Ergün R, Ergan B, Kar Kurt Ö. Occupational Risk Factors and the Relationship of Smoking with Anxiety and Depression. Turk Thorac J 2017. DOI: 10.5152/TurkThoracJ.2017.17055

Abstract

OBJECTIVES: The aim of the present study was to evaluate the relation of smoking with anxiety and depression in workers who were exposed to occupational risk factors. For this purpose, working time, smoking status, nicotine dependence, and respiratory functions of the workers who were exposed to physical and/or chemical harmful substances were evaluated and the presence of anxiety/depression was investigated.

MATERIAL AND METHODS: Male workers who were exposed to occupational risk factors such as solvents, heavy metals, and dust and visited the outpatient clinic for occupational diseases within a one-year period were included. Pulmonary Function Test and Fagerström Test for Nicotine Dependence were performed. Anxiety and depression statuses of the workers were assessed using the Hospital Anxiety and Depression Scale.

RESULTS: The mean age of 665 male workers was 45 y (range, 38–48 y), and they were most commonly exposed to solvents (45.9%), followed by heavy metal fume/dust (20.9%). Of the workers, 252 (37.9%) had anxiety, 294 (44.2%) had depression, and 171 (25.7%) had both. More than half of the workers in each occupation/exposure group were smokers. Respiratory complaints were present in 34% of the workers. According to the regression analysis, the presence of respiratory system complaints was found to be a significant risk factor for anxiety, depression, and anxiety plus depression.

CONCLUSION: In conclusion, smoking and anxiety/depression were found to be the conditions affecting more than half of the workers with occupational exposure.

KEYWORDS: Occupational exposure, smoking, anxiety, depression

Received: *27.07.2017* ***Accepted:*** *14.11.2017* ***Available Online Date:*** *03.01.2018*

INTRODUCTION

Various chemical, physical, and biological pollutants exposed to working environment constitute a socioeconomic burden by causing diseases [1]. Taking preventive measures to avoid exposure to such harmful substances is essential in preventing occupational diseases. For this purpose, many restrictions and regulations are being made [2-5]. Among the exposed pollutants, there are hundreds of substances including organic solvents (toluene, xylene, benzene, trichloroethylene, and acetone), dust and fibers, asbestos, lead, and pesticides [6]. Some confounding factors such as concomitant diseases, drug usage, alcohol consumption, smoking, and stress make the occupational exposure difficult to be measured and controlled [6].

Cigarette smoking remains to be a worldwide significant problem despite the tobacco control policies, which are gradually becoming widespread. According to the World Health Organization, 21% of the adults worldwide are current smokers in 2013 [7]. The role of cigarette smoking in the development of various diseases due to active or passive exposure to cigarette smoke is well-documented. In addition, the relation of cigarette smoking, particularly exposure via inhalation, with some substances exposed to in the working environment, has drawn interest as a research subject [8-11].

Anxiety and depression are among frequently encountered mental health problems. The lifetime prevalence of anxiety disorder in adults is reported to be 33.7% [12]. The lifetime prevalence of depression is reported to be 10% to 15% [13]. Anxiety and depression influence the quality of life of individuals leading to loss of production in the workplace [12,13].

This study was presented at the 35th National TUSAD Congress, 2-6 October 2013, İzmir, Turkey.
Address for Correspondence: Recai Ergün, Department of Chest Diseases, Dışkapı Yıldırım Beyazıt Training and Research Hospital, University of Health Sciences, Ankara, Turkey
E-mail: recaiergun@gmail.com

The present study aimed to evaluate the relation of cigarette smoking with anxiety and depression in those exposed to occupational risk factors. For this purpose, working time, smoking status, nicotine dependence, and respiratory functions of the workers who were exposed to physical and/or chemical harmful substances were evaluated and the presence of anxiety/depression was investigated.

MATERIAL AND METHODS

Study Population

The study was conducted in male workers who had been exposed to occupational risk factors such as solvents (toluene, xylene, benzene, trichloroethylene, acetone), heavy metals (lead, cadmium, nickel, copper), inorganic dusts (silica, quartz, feldspar), noise, and lifting heavy load and visited the outpatient clinic for occupational diseases within a one-year period. The study was approved by the Local Ethics Committee (approval date: September 29, 2013/ No: 10/39). Because of the questionnaire survey, informed consent form was not taken. Participants were informed about the questionnaire. Those who agreed to fill out the questionnaire included in the study. Although the primary route of exposure to dust, solvents, and heavy metals was inhalation, there were workers who were exposed to solvents and heavy metals by direct skin contact. The group of workers who were exposed to dust consisted of those working in mines, ceramic sector, jean abrasion and quarry. Solvent exposure was present among painters and armory, press, and petroleum production workers. The heavy metal fume exposure group has been working in battery factory, metal melting, and recycling sector. In addition to the demographic characteristics, medical histories and smoking status of the workers were recorded. Pulmonary Function Test (PFT), Fagerström Test for Nicotine Dependence (FTND), and Hospital Anxiety and Depression Scale (HADS) were performed.

Pulmonary Function Test

Pulmonary function tests were measured with a ZAN 100 (nSpire Health Inc.; Oberthulba, Germany) PFT device. PFTs were performed according to American Thoracic Society Guidelines [14]. Forced vital capacity (FVC), forced expiratory volume in one second (FEV1), forced mid-expiratory flow, and the ratio of these two values (FEV1/FVC) were obtained. Spirometry was performed at least three times, and the largest sum of FVC+FEV1 (best test) was recorded. The spirometry device was calibrated by measuring wetness and temperature of the room prior to each measurement.

Fagerström Test for Nicotine Dependence

Fagerström Test for Nicotine Dependence has often been used as a measure of physical dependence on nicotine. The test was designed to provide an ordinal measure of nicotine dependence related to cigarette smoking. It contains six items that evaluate the quantity of cigarette consumption, the compulsion to use, and dependence.

In scoring the FTND, yes/no items are scored from 0 to 1 and multiple-choice items are scored from 0 to 3. The items are summed to yield a total score of 0-10. The higher the total Fagerström score, the more intense is the patient's physical dependence on nicotine [15].

FTND score was interpreted as follows: 0-3=Low, 4-6=Moderate, and 7-10=Severe nicotine dependence. The validity and reliability study for the Turkish version of FTND were done by Uysal et al. [16].

Hospital Anxiety and Depression Scale

Anxiety and depression statuses of the workers were assessed using HADS [17]. The participants were asked to fill out the self-reported HADS questionnaire for the evaluation of psychological distress. The scale is composed of 14 questions in which the overall severity of anxiety and depression was rated on a 4-point Likert-type scale (0 to 3). Seven questions were associated to anxiety and seven to depression [18]. Psychological distress score was described as the total HAD score. HADS scores were interpreted as follows: 0-7=Normal, 8-10=Borderline abnormal (borderline case), and 11-21=Abnormal (case). In the present study, borderline case and case groups (HADS score ≥8) were evaluated together. The validity and reliability study for the Turkish version of HADS was performed by Aydemir et al. [17]. The workers were divided into four groups according to HADS score:

Group A: anxiety alone,
Group D: depression alone,
Group A+D: both anxiety and depression,
Group N: neither anxiety nor depression

Statistical Analysis

Statistical analyses were performed using the Predictive Analytics Software (PASW) Statistical Package for Social Sciences Windows version 18.0 (SPSS Inc.; Chicago, IL, USA). Descriptive statistics were presented as number and percentage for categorical variables and as mean, standard deviation, median, 25th percentile (Q1), and 75th percentile (Q3) for numerical variables. Normality of the variables was analyzed using visual (histogram and probability graphs) and analytic (Kolmogorov–Smirnov/Shapiro-Wilk tests) methods. Pairwise and multiple comparisons between categorical variables were done by the chi-square test and by Fisher's exact test and Fisher's exact test with multiple contingency where chi-square test is not suitable. Mann-Whitney U test was used for paired group comparisons of the numerical variables that were not normally distributed. The risk factors for anxiety and depression were analyzed by logistic regression analysis. The level of statistical significance was predetermined to be $p<0.05$.

RESULTS

In the present study, 665 male workers with a median age of 45 y (range, 38-48 y) were included. The workers were most commonly exposed to solvents (45.9%), followed by heavy metal fume/dust (20.9%). Demographic characteristics, occupational data, working time, educational status, smoking status, respiratory complaints, and concomitant diseases of

Table 1. Demographic characteristics and occupational data of the workers

	N	Median(Q1-Q3)	n (%)
Age, years			
Gender	665	45 (38-48)	
Male	665		665 (100)
Occupation/ Exposure group	665		
Solvent			305 (45.9)
Heavy metal			139 (20.9)
Inorganic dust			88 (13.2)
Lifting Load			73 (11.0)
Noise			60 (9.0)
Working Duration, years		20 (10-24)	
Number of Weekly Working Days		5 (5-6)	
Daily Working Hours		8 (8-8.5)	
Educational Status	665		
Illiterate/Primary School			392 (58.9)
High School/ Business High School			245 (36.8)
Collage/University			28 (4.2)
Smoking Status	665		
Non-smoker			123 (18.5)
Ex-smoker			181 (27.2)
Current Smoker			361 (54.3)
Duration of cigarette smoking, years	542	20 (14-25)	
Pack-Years	542	15 (6-25)	
FTND score	361	3.00 (2.00-5.00)	
Nicotine dependence according to FTND	361		
Low			180 (49.9)
Moderate			135 (36.5)
Severe			50 (13.6)
Current complaint			226 (34.0)
Sputum			113 (17.0)
Cough			106 (15.9)
Shortness of breath			105 (15.8)
Wheezing			63 (9.5)
Chest pain			37 (5.6)
Haemoptysis			3 (0.5)
Concomitant disease			98 (14.7)
Asthma			32 (4.8)
Hypertension			21 (3.2)
Diabetes			21 (3.2)
COPD			20 (3.0)
Other			34 (5.1)

FTND, Fagerstrom Test for Nicotine Dependence; COPD, Chronic obstructive pulmonary disease

Table 2. Distribution of age and occupation/exposure according to smoking status

	n	Non-smoker (n=123)	Ex-smoker (n=181)	Current Smoker (n=361)	p
Age group, years					
≤29	52	13 (25.0)	8 (15.4)	31 (59.6)	0.017
30-39	133	25 (18.8)	26 (19.5)	82 (61.7)	
40-49	369	65 (17.6)	105 (28.5)	199 (53.9)	
≥50	111	20 (18.0)	42 (37.8)	49 (44.1)	
Occupation/exposure group					
Solvent	305	57 (18.7)	79 (25.9)	169 (55.4)	
Heavy metal	139	24 (17.3)	41 (29.5)	74 (53.2)	
Inorganic dust	88	11 (12.5)	29 (33.0)	48 (54.5)	0.678
Lifting load	73	17 (23.3)	17 (23.3)	39 (53.4)	
Noise	60	14 (23.3)	15 (25.0)	31 (51.7)	

Table 3. Results of pulmonary function tests

	N	Median (Q1-Q3)
FVC, %	615	97.00 (89.00-105.00)
FEV_1, %	615	95.00 (85.00-104.00)
FEF_{25-75}, %	615	81.00 (62.00-99.00)
FEV_1/FVC, %	615	81.00 (76.00-84.00)

FVC: forced vital capacity; FEV1: forced expiratory volume in 1 second; FEF: forced expiratory flow

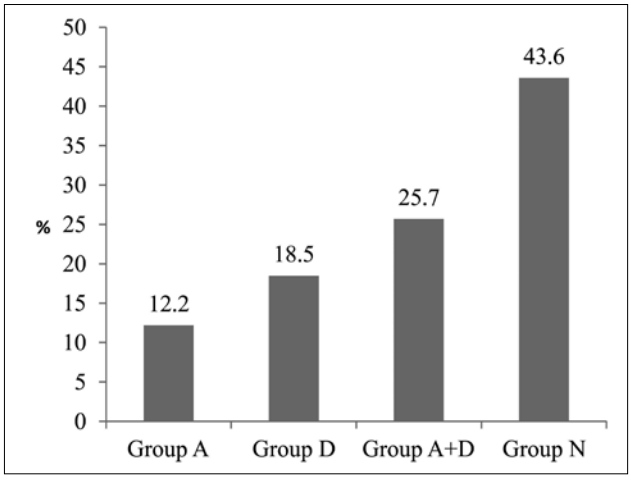

Figure 1. Distribution of the workers among groups according to the Hospital Anxiety and Depression Scale score

the workers are summarized in Table 1. Respiratory complaints were present in 34% of the workers, and concomitant disease was in question in 14.7%, of which 4.8% had asthma and 3% had chronic obstructive pulmonary disease (COPD).

Of the workers, 54.3% were current smokers with a median smoking duration of 20 y, and 13.6% of them had severe nicotine dependence according to FTND scores. Information about the workers' smoking status is summarized in Table 1. There was a significant difference between the groups in terms

Table 4. Demographic and occupational characteristics of the groups according to the Hospital Anxiety and Depression Scale

	Group N (n=290)	Group A (n=81)	Group D (n=123)	Group A+D (n=171)	p1	p2	p3
Age group, years							
≤29	22 (7.6)	5 (6.2)	11 (8.9)	14 (8.2)			
30-39	50 (17.2)	24 (29.6)	23 (18.7)	36 (21.1)	0.082	0.932	0.607
40-49	169 (58.3)	43 (53.1)	68 (55.3)	89 (52.0)			
≥50	49 (16.9)	9 (11.1)	21 (17.1)	32 (18.7)			
Educational status							
Illiterate/Primary school	162 (55.9)	51 (63.0)	72 (58.5)	107 (62.6)			
High school/Business High School	112 (38.6)	25 (30.9)	50 (40.7)	58 (33.9)	0.441	0.089	0.304
College/University	16 (5.5)	5 (6.2)	1 (0.8)	6 (3.5)			
Occupation/Exposure group							
Heavy metal	57 (19.7)	15 (18.5)	26 (21.1)	41 (24.0)			
Solvent	131 (45.2)	40 (49.4)	57 (46.3)	77 (45.0)			
Lifting load	37 (12.8)	8 (9.9)	14 (11.4)	14 (8.2)	0.391	0.628	0.108
Inorganic dust	31 (10.7)	13 (16.0)	17 (13.8)	27 (15.8)			
Noise	34 (11.7)	5 (6.2)	9 (7.3)	12 (7.0)			
Duration of employment, years	20 (8-25)	18 (12-24)	20 (7-24)	18 (10-24)	0.823	0.857	0.470
Number of weekly working days	5.47±0.70	5.41±0.79	5.56±0.69	5.59±0.71	0.716	0.208	0.036
	5 (5-6)	5 (5-6)	5 (5-6)	5 (5-6)			
Daily working hours	8.34±1.31	8.88±1.40	8.38±1.09	8.64±1.31	<0.001	0.795	0.045
	8 (8-8.5)	8.5 (8-9)	8 (8-8.5)	8 (8-9)			

The values are presented as number (%), median (Q1-Q3) or mean±standard deviation

p1: difference between Group N and Group A; p2: difference between Group N and Group D; p3: difference between Group N and Group A+D

of age distribution according to smoking status (Table 2). While the prevalence of smokers was the highest (61.7%) in the age group of 30–39 y, the prevalence of non-smokers was the highest (25%) in the age group of ≤29 y, and the prevalence of ex-smokers was the highest (37.8%) in the age group of ≥50 y. More than half of the workers in each occupation/exposure group were smokers. Of the workers, 80.8% have tried to quit smoking at least once and the reason for trying to quit was wishing to be healthy in 55.9%.

PFT was performed in 615 (92.5%) subjects. The results of the PFTs were summarized in Table 3.

According to HADS (score ≥8 for borderline+case group), at least one of anxiety and depression was present in 375 (56.4%) workers. Anxiety and depression were determined in 252 (37.9%) and 294 (44.2%) workers, respectively, whereas 171 (25.7%) workers had both. The workers were divided into four groups according to HADS score (Figure 1):

Group A: anxiety alone, n=81 (12.2%),
Group D: depression alone, n=123 (18.5%),
Group A+D: both anxiety and depression, n=171 (25.7%),
Group N: neither anxiety nor depression (normal), n=290 (43.6%).

Group A, Group D, and Group A+D were compared with Group N in terms of demographic and occupational characteristics. No difference was found among the groups in terms of age, educational status, or type of occupation/exposure. Daily working hours were significantly longer in Group A and Group A+D than in Group N. Number of weekly working days as well was higher in Group A+D than in Group N (Table 4).

Group A, Group D, and Group A+D were compared with Group N in terms of smoking status, PFT results, concomitant diseases, and complaints (Table 5). Smoking status was not different among the groups; nevertheless, FTND score was significantly higher in Group A and Group A+D than in Group N. In addition, FVC and forced expiratory volume in 1-second (FEV_1) values of Group A+D were significantly lower than that of Group N. Respiratory system complaints were more prevalent in those with anxiety and/or depression than the workers in the Group N (Table 5).

Regression analysis, which was performed to determine the risk factors, revealed that the presence of respiratory system complaints was a risk factor for anxiety (Odds ratio [OR]=2.25, 95% Confidence interval [CI]: 1.34-3.78, p=0.002), depression (OR=1.84, 95% CI: 1.17-2.88, p=0.008), and anxiety plus depression (OR=1.98, 95% CI: 1.32-2.96, p=0.001) (Table 6).

Table 5. Smoking status, pulmonary function test results, concomitant diseases, and symptoms of the groups according to the Hospital Anxiety and Depression Scale

	n	Group N	n	Group A	N	Group D	n	Group A+D	p1	p2	p3
Smoking status	290		81		123		171				
Non-smoker		57 (19.7)		10 (12.3)		26 (21.1)		30 (17.5)	0.291	0.207	0.838
Ex-smoker		75 (25.9)		21 (25.9)		41 (33.3)		44 (25.7)			
Current Smoker		158 (54.5)		50 (61.7)		56 (45.5)		97 (56.7)			
FTND score	158	3 (2-5)	50	4 (2-6)	56	3 (2-5)	97	4 (2-6)	0.013	0.450	0.031
PFT result											
FVC, %	271	99 (90-107)	77	97 (90-104)	107	95 (88-106)	160	95 (87-104)	0.408	0.256	0.026
FEV1, %	271	98 (86-105)	77	94 (86-100)	107	95 (85-104)	160	94 (83-102)	0.158	0.491	0.035
FEF25-75, %	270	83 (63-101)	77	74 (59-96)	107	82 (67-98)	159	79 (61-98)	0.166	0.788	0.351
FEV1/FVC, %	271	81 (77-84)	77	80 (76-84)	107	81 (77-84)	160	80.5 (76-84)	0.442	0.859	0.499
Presence of respiratory system complaints	290	74 (25.5)	81	35 (43.2)	123	48 (39.0)	171	69 (40.4)	0.002	0.006	0.001
Presence of concomitant disease	290	39 (13.4)	81	14 (17.3)	123	20 (16.3)	171	25 (14.6)	0.383	0.455	0.725

The values are presented as number (%) or median (Q1-Q3).

p1: difference between Group N and Group A; p2: difference between Group N and Group D; p3, difference between Group N and Group A+D

FTND: Fagerstrom Test for Nicotine Dependence; PFT: Pulmonary Function Test; FVC: forced vital capacity; FEV1: forced expiratory volume in 1 second; FEF: forced expiratory flow

Table 6. Logistic regression analysis

	p	OR	95.0% CI OR	
Anxiety				
Age Group (≤29 - Reference)	0.087			
30-39	0.178	2.13	0.71	6.41
40-49	0.804	1.14	0.40	3.23
≥50	0.692	0.78	0.23	2.64
Presence of respiratory system complaints	0.002	2.25	1.34	3.78
Depression				
Educational Status (Illiterate/Primary School - Reference)	0.183			
High School/Business High School	0.826	1.05	0.68	1.63
Collage/University	0.071	0.15	0.02	1.18
Presence of respiratory system complaints	0.008	1.84	1.17	2.88
Anxiety+Depression				
Presence of respiratory system complaints	0.001	1.98	1.32	2.96

DISCUSSION

In the present study that we conducted in 665 male workers who were exposed to occupational risk factors, it was determined that the most common exposure was solvent exposure (45.9%); 54.3% of the workers were current smokers; 13.6% had severe nicotine dependency according to FTND; 34% had respiratory system complaints; 14.7% had a concomitant disease (most frequently asthma); and 56.4% had anxiety and/or depression. Presence of a respiratory system complaint was a significant risk factor for anxiety and/or depression.

There is a documented relationship between cigarette addiction and anxiety and/or depression. This relationship has been demonstrated in the studies conducted in different populations [19-25]. The prevalence of tobacco consumption among Turkish males was reported to be 41.5% in 2012 [26]. The present study found that 54.3% of male workers (study population) were current smokers and that 80.8% of them tried to quit smoking for at least once to be healthy. A study conducted in construction workers (n=763) found heavy smoking to be associated with exposure to chemical substances in the working environment [27]. In the present study, more than half of the workers in each occupation/exposure group were current smokers. Although the prevalence of smoking was the highest (55.4%) in the solvent exposure group, no statistically significant difference was found between the groups in terms of smoking status. Nevertheless, the prevalence of smoking in each exposure group was higher than the prevalence rate reported for Turkish male population (41.5%).

A study conducted in rubber industry workers demonstrated that smoking and occupational exposure to respiratory system pollutants have a synergistic effect on PFTs [28]. In the present study, concomitant disease was determined in 14.7% of the workers, with asthma determined in 4.8% and COPD deter-

mined in 3% of them. Although more than half of the workers with occupational exposure were current smokers, the mean value of PFTs was above 80%. Nevertheless, FVC and FEV_1 values were found to be significantly lower in the workers with anxiety plus depression than in the normal group. The fact that the smoking status of the anxiety plus depression group was not different from the normal group; however, daily working hours and the number of weekly working days were higher, suggesting that impaired PFT might be due to exposure.

It was demonstrated that anxiety and depression are more prevalent among those with organic solvent exposure as compared with the control group [29]. An increase of various psychological disorders including anxiety and depression was reported in the subjects with asbestos intoxication [30]. All of the participants of the present study were the workers with occupational exposure; among these, the group with the highest prevalence of anxiety and/or depression (64.8%) was the group of inorganic dust exposure/sewage workers. The absence of a control group without occupational exposure can be considered as a limitation of the present study. Nevertheless, the high prevalence of anxiety and/or depression in all exposure groups is a striking finding. Considering all of the workers, the prevalence of anxiety and/or depression was 56.4%.

Mykletun et al. [31] conducted a population-based large-scale study and demonstrated a strong relationship between anxiety and depression assessed by HADS and smoking. In the present study, there was no difference between the anxiety, depression, anxiety plus depression, and normal groups in terms of smoking status. However, FTND score was significantly higher in the anxiety and anxiety plus depression groups than in the normal group.

In the present study, the presence of respiratory system complaints was determined to be a risk factor for developing anxiety and depression. The presence of a respiratory system complaint enhanced the risk of anxiety by 2.25-folds, risk of depression by 1.84 folds, and risk of anxiety plus depression by 1.98-folds. Koulouri et al. [32] conducted a study including 100 males working in shipbuilding industry and 100 males from the general population as the control group and found that coexistence of chronic diseases and smoking addiction affects the individuals' emotion and social functioning.

In conclusion, smoking and anxiety/depression were found to be the conditions affecting more than half of the workers with occupational exposure. The presence of respiratory system complaints was a significant risk factor for anxiety/depression. The unfavorable effects of occupational exposure and smoking on respiratory system have been documented; this negativity also has an impact on the quality of life and psychosocial status of the individuals. Intensive efforts should be made to encourage the subjects exposed to occupational risk factors to quit smoking. They should also be closely monitored for respiratory system complaints.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of University of Health Sciences, Dışkapı Yıldırım Beyazıt Training and Research Hospital.

Informed Consent: N/A.

Peer-review: Externally peer-reviewed.

Author contributions: Concept - D.E., R.E.; Design - D.E., R.E., B.E.; Supervision - D.E., B.E., Ö.K.; Resource - D.E., R.E.; Materials - D.E., R.E.; Data Collection and/or Processing - D.E., R.E.; Analysis and/or Interpretation – D.E., B.E., Ö.K.; Literature Search - D.E.; Writing - D.E.,Ö.K.K.; Critical Reviews - D.E.,B.E., Ö.K.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Montano D. Chemical and biological work-related risks across occupations in Europe: a review. J Occup Med Toxicol 2014;9:28. [CrossRef]
2. Hunter WJ, Aresini G, Haigh R, et al. Occupational exposure limits for chemicals in the European Union. Occup Environ Med 1997;54:217-22. [CrossRef]
3. Taylor A, Angerer J, Arnaud J, et al. Differences in national legislation for the implementation of lead regulations included in the European directive for the protection of the health and safety of workers with occupational exposure to chemical agents (98/24/EC). Int Arch Occup Environ Health 2007;80:254-64. [CrossRef]
4. Fairhurst S. Hazard and risk assessment of industrial chemicals in the occupational context in Europe: some current issues. Food Chem Toxicol 2003;41:1453-62. [CrossRef]
5. Nielsen GD, Ovrebø S. Background, approaches and recent trends for setting health-based occupational exposure limits: a minireview. Regul Toxicol Pharmacol 2008;51:253-69. [CrossRef]
6. Health and Safety Executive. EH40/2005 Workplace exposure limits. 2nd edition, 2011. Available from: http://www.hse.gov.uk/pubns/priced/eh40.pdf
7. World Health Organization. WHO report on the global tobacco epidemic, 2015: Raising taxes on tobacco. Available from: http://apps.who.int/iris/bitstream/10665/178574/1/9789240694606_eng.pdf?ua=1&ua=1
8. Hessel PA, Gamble JF, Nicolich M. Relationship between silicosis and smoking. Scand J Work Environ Health 2003;29:329-36. [CrossRef]
9. Lee PN. Relation between exposure to asbestos and smoking jointly and the risk of lung cancer. Occup Environ Med 2001;58:145-53. [CrossRef]
10. Yang A, Cheng N, Pu H, et al. Occupational metal exposures, smoking and risk of diabetes and prediabetes. Occup Med (Lond) 2016. pii: kqw078. [Epub ahead of print].
11. Bizoń A, Antonowicz-Juchniewicz J, Milnerowicz M, et al. The effect of occupational exposure on pro/antioxidant balance in the blood of non-smoking and smoking smelters with diabetes. Environ Toxicol Pharmacol 2016;44:99-106. [CrossRef]
12. Bandelow B, Michaelis S. Epidemiology of anxiety disorders in the 21st century. Dialogues Clin Neurosci 2015;17:327-35.
13. Lépine JP, Briley M. The increasing burden of depression. Neuropsychiatr Dis Treat 2011;7:3-7.
14. Miller MR, Hankinson J, Brusasco V, et al. Standardisation of spirometry. Eur Respir J 2005;26:319-38. [CrossRef]

15. Pomerleau CS, Majchrezak MI, Pomerleau OF. Nicotine dependence and the Fagerstrom Tolerance Questionnaire: a brief review. J Substance Abuse 1989;1:471-7.
16. Uysal MA, Kadakal F, Karşidağ C, et al. Fagerstrom test for nicotine dependence: reliability in a Turkish sample and factor analysis. Tuberk Toraks 2004;52:115-21.
17. Aydemir Ö, Güvenir T, Küey L, Kültür S. Validity and Reliability of Turkish Version of Hospital Anxiety and Depression Scale. Turk Psikiyatri Derg 1997;8:280-7.
18. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand 1983;67:361-70. [CrossRef]
19. Fakhfakh R, Aouina H, Gharbi L, et al. [moking dependence and symptoms of anxiety and depression among Tunisian smokers. Rev Mal Respir 2003;20:850-7.
20. Jamal M, Does AJ, Penninx BW, et al. Age at smoking onset and the onset of depression and anxiety disorders. Nicotine Tob Res 2011;13:809-19. [CrossRef]
21. Khaled SM, Bulloch A, Exner DV, et al. Cigarette smoking, stages of change, and major depression in the Canadian population. Can J Psychiatry 2009;54:204-8. [CrossRef]
22. Korhonen T, Koivumaa-Honkanen H, Varjonen J, et al. Cigarette smoking and dimensions of depressive symptoms: longitudinal analysis among Finnish male and female twins. Nicotine Tob Res 2011;13:261-72. [CrossRef]
23. McClave AK, Dube SR, Strine TW, et al. Associations between smoking cessation and anxiety and depression among U.S. adults. Addict Behav 2009;34:491-7. [CrossRef]
24. Rachiotis G, Behrakis PK, Vasiliou M, et al. Quality of life and smoking among industrial workers in Greece. Med Lav 2006;97:44-50.
25. Holahan CK, Holahan CJ, Powers DA, et al. Depressive symptoms and smoking in middle-aged and older women. Nicotine Tob Res 2011;13:722-31. [CrossRef]
26. T.C. Sağlık Bakanlığı, Türkiye Halk Sağlığı Kurumu. Küresel Yetişkin Tütün Araştırması Türkiye 2012. Sağlık Bakanlığı Yayın No: 948, Ankara, 2014. Available from: http://www.halksagligiens.hacettepe.edu.tr/KYTA_TR.pdf
27. Chin DL, Hong O, Gillen M, et al. Heavy and light/moderate smoking among building trades construction workers. Public Health Nurs 2013;30:128-39. [CrossRef]
28. Attarchi M, Dehghan F, Afrasyabi M, et al. Combined effect of cigarette smoking and occupational exposures on lung function: a cross-sectional study of rubber industry workers. Workplace Health Saf 2013;61:213-20. [CrossRef]
29. Morrow LA, Gibson C, Bagovich GR, et al. Increased incidence of anxiety and depressive disorders in persons with organic solvent exposure. Psychosom Med 2000;62:746-50. [CrossRef]
30. Clemente M, Reig-Botella A, Prados JC. Alterations in psychosocial health of people affected by asbestos poisoning. Rev Saude Publica 2015;49:24. [CrossRef]
31. Mykletun A, Overland S, Aarø LE, et al. Smoking in relation to anxiety and depression: evidence from a large population survey: the HUNT study. Eur Psychiatry 2008;23:77-84. [CrossRef]
32. Koulouri A, Roupa Z, Sarafis P, et al. Assessment of health level and socio-economic characteristics of people working in the shipbuilding industry: a control group study. Glob J Health Sci 2014;7:154-61. [CrossRef]