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PREVALENCE OF DEPRESSION AMONG EMPLOYEES IN THE PUBLIC ADMINISTRATION, PRIVATE AND INDUSTRIAL SECTORS

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Abstract. Background: *Symptoms of depressive disorder have been found to be particularly common among employees in the private administration, public, and industrial sectors.* ***Aims:*** *This study aimed to assess the prevalence of depression among the specified groups of workers and to identify the main stressors that lead to symptoms of this condition.* ***Materials and methods:*** *A self-administrated questionnaire was completed by respondents comprised of three groups of workers in the Republic of North Macedonia – Skopje. The survey assessed the sociodemographic characteristics and mental health (Patient Health Questonnaire-9). Logistic regression models were used to estimate associations between depressive symptoms and demographics, working environment and lifestyle parameters.* ***Results:*** *The analysis of the total PHQ-9 score divided into two groups (≤ 10 and ≥ 10) indicated that 89% of the respondents had minimal/mild depression and 11% had moderate/severe depression. We have found a significant association between the group to which the respondent belongs and the degree of depression. Severe depression was significantly associated with work in public institutions.* ***Conclusion:*** *Screening for depression among workers is necessary because of its high prevalence and high rates of underdiagnosis in the workplace. Early diagnosis and appropriate interventions are recommended, including actions focused on the risk factors for depression at the workplace.*

Key words: *depression, Patient Health Questionnaire, workers*

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INTRODUCTION

Depression is a common mental disorder that affects functioning, including occupational which is a fundamental right, enabling social interaction and financial support for the individual. There is less data on how occupational factors lead to depression and more research in this field is necessary. Worldwide, more than 264 million people suffer from this type of medical condition, making it one of the leading causes of disability [1]. Depression is defined as a mood disorder with persistent sadness and a lack of interest or pleasure in previously rewarding or enjoyable activities that affects the way a person feels, thinks or behaves, leading to impairment in personal, social, or occupational functioning

[2, 3]. The twelve-month prevalence of major depressive disorder has been estimated at 3.7% [4].

The causes of depression include complex interactions between biological, psychosocial or, environmental factors, including risk factors present at the workplace. Those who have experienced an episode of depression previously are at greater risk of having future episodes [5]. Worldwide data indicate several risk factors related to depression. For example, age between 45 and 55 represents the highest life-time prevalence in women and over 55 years in men [4].

International literature provides data on a strong connection between depression, medical and contextual factors. Indeed, persons with chronic medical conditions are more likely to develop depression [6]. Other factors such as education degree, smoking, and alcohol consumption are less understood and the literature remains unclear regarding the direction and extent of the association [7].

Working conditions are closely related to the general and mental state of employees through occupational stress resulting in negative emotional experiences at the workplace caused by working factors leading to the development of depressive disorder [8, 9, 10]. Work-related risk factors such as a high job strain, need for permanent concentration and overtime, have an important role in the employees workability [11].

A mentally healthy workplace has high productivity levels and it is efficient and open for discussions about mental health issues [12].

Healthy employees with highly functional levels are important for ensuring efficiency at any service [2]. Reduced productivity and increased absenteeism often lead to reduction in profits. The costs of the measures needed to deal with this problem will lead to potential economic liability for the employer [13].

Therefore, we aim to analyze the prevalence of depression in public, private administration and factory workers, and assess the extent of the association between symptoms of depression and several factors including demographics, working environment and lifestyle decisions.

The objectives of the study were to investigate the predictive role of the selected parameters for depression among the specified groups of workers.

In view of the epidemiological importance, the pertinence of occupational risk factors and the presence of impact on absenteeism, and disability, this study seeks to evaluate the scientific evidence that demonstrates the consistency and the effectiveness of the screening of depression at work focused on the modification of occupational outcomes.

MATERIALS AND METHODS

This was an analytical cross-sectional study, conducted at the Institute of Occupational Health of the Republic of the North Macedonia, Skopje, WHO Collaborating Center, supported by the Department of Psychiatry, Medical Faculty of the Republic of Bulgaria. Participation in the study was voluntary, confidential and anonymous. Eligible individuals were employees visiting the Institute for regular medical examinations in the period of three months. According to the inclusion and exclusion criteria, workers from three different professional environments were selected, where 126 (50.8%) were male and 122 (49.2%) were female. Age was divided into five groups: younger than 25, 25-34, 35-44, 45-55 and older than 55. They were introduced to the study and given a consent form, a demographic and a PHQ-9 questionnaire to complete. The Ethical Committee of the Institute of Occupational Health of the Republic of North Macedonia, Skopje gave approval for performing the study and publishing the results obtained (03-0302-71/2).

The research covered a total of 248 respondents, and according to the type of working institution, they were divided into three groups: private administration, public administration and factory workers.

The analysis of the demographic characteristics included gender, age and marital status.

In regards to the working environment issues, we covered two parameters: length of work experience in the current institution (years) and the number of working hours per week.

Lifestyle analysis included the following parameters: BMI, eating habits, alcohol consumption (consumption/no consumption per week), physical activity (activity/no activity per week) and sleeping habits. Also, we observed the presence/absence of chronic diseases.

All mentioned parameters were analyzed generally for all respondents as well as in relation to the type of the institution they worked in.

Depression symptoms in our participants were measured using the Patient Health Questionnaire (PHQ)-9, which is a reliable and a valid measure for depression severity [14]. PHQ-9 questionnaire has nine items using a 4-point (0-3) Likert scale assessing problems experienced by the participants over the last 2 weeks. A total score of 5-9 indicated mild depression; 10-14 – moderate depression; and a score of 15 or more indicated moderately severe to severe depression. A score of 10 or more had a sensitivity of 88% and a specificity of 88% for depression [14, 15]. The internal

consistency of the PHQ-9 questions was processed by Reliability and we got Cronbach's Alpha = 0.864.

Statistical Analysis

All data collected were logged and keyed in Microsoft Excel (2010) and statistically processed using SPSSversion 22.0 for Windows (SPSS, Chicago, IL, USA). Descriptive statistics were generated for all variables to ensure normality of distributions. Numerical variables were presented as mean ± standard deviation and categorical variables were presented as a frequency and percentage. Pearson Chi square test, Yates corrected, Fisher exact test and Fisher Freeman Halton test were used to determine the association between certain features. Spearman rank correlation coefficient were used to determine the relationship between numerical variables with not-normal frequency distribution. Dependent sample analysis was performed on McNemar Chi-square. Risk factors were quantified using Odd ratio (OR) and Confidence interval (CI). The difference between the proportions and the correlations were tested with Percentage Difference Test and Correlation Difference Z test. Univariate and multiple logistic regression analysis were used to assess the impact of certain parameters on the variability of the overall score for depression. The study considered any variable with a p-value less than 0.05 as a statistically significant.

RESULTS

Of the total 248 employed individuals we analyzed, 79 (31.8%) were private administration workers, 81 (32.7%) – public administration workers and 88 (35.5%) were factory workers. The mean PHQ-9 score in the public administration workers group was statistically significantly higher than in the private administration and factory workers groups: 5.44 ± 5.57, 2.72 ± 3.09 and 2.43 ± 3.31, respectively (p = 0.001). The mean PHQ-9 score in the three groups according to the type of work and according to demographic characteristics are presented in Table1.

The analysis in each of the groups showed that there was no significant difference in the total PHQ-9 score in terms of gender, age and marital status. However, the participants working in a public institution had significantly higher PHQ-9 scores compared to those from the private and factory groups when the parameters were analyzed separately. Partner presence, male and female gender and younger age (25-34) were associated with the highest PHQ-9 scores in the public administration group.

In the public administration groups, aged ≤ 24 and ≥ 55, as a result of the large oscillations in answers, we have found abnormally distributed numerical parameters, which was considered and proceeded with non-parametric tests (MannWhitneyU test, Kruskal-Wallis H test) and indicated that there was no statistical significance (p = 0.353).

The physical activity, alcohol consumption and presence of chronic diseases did not influence significantly total PHQ-9 score. There were also no significant differences according to these characteristics when the three groups were investigated separately. The results are presented in Table 2.

Table 1. Analysis of total PHQ-9 scores according to demographic parameters and the type of work

Characteristics	Private administration	Public administration	Factory workers	Total	P value[a]
Gender					
Female	2.45 ± 2.77	5.22 ± 5.27	2.78 ± 3.71	3.49 ± 4.21	0.027*
Male	3.00 ± 3.40	5.67 ± 5.93	2.13 ± 2.94	3.52 ± 4.47	0.015*
Age group					
≤ 24	0.67 ± 0.58	9.00 ± 1.41	1.33 ± 2.31	3.00 ± 3.96	0.117
25-34	3.63 ± 4.05	6.86 ± 5.61	2.31 ± 2.24	3.80 ± 4.18	0.009*
35-44	2.81 ± 3.11	4.82 ± 5.45	2.34 ± 2.87	3.31 ± 4.11	0.224
45-54	2.43 ± 2.06	4.08 ± 4.05	2.30 ± 3.68	3.31 ± 4.11	0.332
≥ 55	2.18 ± 1.83	6.67 ± 8.09	1.00 ± 0.00	4.05 ± 5.77	0.670
Marital status					
With partner	2.52 ± 2.86	5.76 ± 5.93	2.41 ± 3.61	3.46 ± 4.49	0.002*
Single	3.50 ± 3.90	4.77 ± 4.76	2.50 ± 2.43	3.64 ± 3.91	0.315

[a] Kruskal-Wallis H test:Chi-square

Significant *P < 0.05

Table 2. Analysis of total PHQ-9 scores according to physical activity, alcohol consumption and chronic diseases

Characteristics	Private administration	Public administration	Factory workers	Total	P value[a]
Physical activity					
No	2.58 ± 3.41	5.98 ± 5.89	2.78 ± 3.73	3.90 ± 4.81	0.005*
Yes	2.85 ± 2.80	4.43 ± 4.86	1.94 ± 2.49	2.99 ± 3.51	0.082
Alcohol consumption					
No	2.43 ± 2.65	6.02 ± 5.89	2.02 ± 2.28	3.70 ± 4.54	0.0001**
Yes	3.09 ± 3.58	3.13 ± 3.26	3.16 ± 4.55	3.12 ± 3.88	0.712
Chronic diseases					
No	2.72 ± 3.23	5.63 ± 5.86	2.40 ± 3.40	3.52 ± 4.52	0.002*
Yes	2.71 ± 2.43	4.46 ± 3.73	2.86 ± 2.27	3.41 ± 3.01	0.478

[a]Kruskal-Wallis H test:Chi-square

Significant *P < 0.05. **P < 0.001

Workers without physical activity from the public sector had significantly more common symptomatology of depression compared to the participants from the private sector and production: 5.98 ± 5.89, 2.58 ± 3.41 and 2.78 ± 3.73, respectively (p = 0.007; p = 0.045). Analysis from the public administration without alcohol consumption showed a significantly higher PHQ-9 score compared to those from the private and production group: 6.02 ± 5.89, 2.43 ± 2.65 and 2.02 ± 2.28, respectively (p = 0.004; p = 0.0001). Public workers without chronic diseases had significantly more depression symptoms than other groups: 5.63 ± 5.86; 2.72 ± 3.23; 2.40 ± 3.40 respectively, (p = 0.015; p = 0.001) (Table 2).

The correlation between total PHQ-9 score and lifestyle parameters are demonstrated in Table 3. There was a significant negative linear correlation between PHQ-9 score, sleeping hours and eating habits. As the sleeping hours as well as improving eating habits increased, PHQ-9 score decreased (p = 0.004; p = 0.0005).

Distribution according to the division of the total PHQ-9 score divided into two groups (< 10, ≥ 10), demonstrated strongly evident higher prevalence of minimal/mild depression in a total of 221 workers (89.09%), compared to moderate/severe depression in 27 (10.91%). Our sample showed a significant association between a group to which the respondent belonged and the degree of depression. It was significantly more serious among the public employees (n = 20, 24.7%) compared to the private (n = 4, 5.1%) and factory workers (n = 3, 3.4%). There was no significant association between the degree of depression in private institution and factory.

From the total number of respondents, 176 (70.97%) were with minimal, 45 (18.15%) mild, 17 (6.85%)

Table 3. Analysis of total PHQ-9 scores according to lifestyle parameters

Characteristics	Total PHQ score-Spearman Rank order correlations			
	Private administration	Public administration	Factory workers	Total
BMI	(n = 78) rs = 0.085 p = 0.461	(n = 73) rs = 0.105; p = 0.378	(n = 88) rs = -0.125; p = 0.244	(n = 239) rs = -0.008; p = 0.904
Hours of night sleeping	(n = 78) rs = -0.259 p = 0.022	(n = 75) rs = -0.143; p = 0.222	(n = 88) rs = -0.275; p = 0.010	(n = 246) rs = -0.183; p = 0.004
Breakfasts per week	(n = 78) rs = -0.013 p = 0.910	(n = 77) rs = -0.136; p = 0.237	(n = 87) rs = -0.322; p = 0.022	(n = 246) rs = -0.196; p = 0.002
Regular meals per week	(n = 78) rs = -0.251 p = 0.014	(n = 77) rs = -0.278; p = 0.014	(n = 87) rs = -0.329; p = 0.002	(n = 245) rs = -0.356; p = 0.0005
Fast food per week	(n = 78) rs = 0.215 p = 0.059	(n = 77) rs = 0.114; p = 0.322	(n = 87) rs = 0.049; p = 0.653	(n = 245) rs = 0.133 p = 0.039

moderate and 10 (4%) moderately severe depression. In the three groups individually (private, public and factory workers) distribution was: minimal depression – 60 (75.9%), 44 (54.3%), 72 (81.8%), mild depression – 15 (18.99%), 17 (20.99%), 12 (14.8%), moderately severe – 3 (3.8%), 12 (14.8%), 2 (2.3%), and moderate to severe – 1 (2.3%), 8 (9.9%) and 1 (1.1%), respectively.

The results of the univariate logistic regression for the predictive role in relation to the total PHQ-9 score, grouped as minimal/mild depression (≤ 10) and moderate/ severe depression (≥ 10), for $p < 0.05$, indicated the following parameters as significant: group (public, factory), length of work experience and eating habits (Table 4). The other parameters (gender, age, marital status, working hours, BMI, physical activity, alcohol consumption, night sleeping, and chronic diseases) were confirmed as insignificant predictors.

Work in a public institution as well as length of service in years were significantly positively associated with moderate/severe depression (OR = 7.49; 95% CI 3.02-18.61; p = 0.001) and (OR = 1.05; 95% CI1.01-1.08; p = 0.017). Industrial work, as well as the number of regular meals per week were significantly negatively associated with moderate/severe depression (OR = 0.2; 95% CI 0.06-0.68; p = 0.010) and (OR = 0.67; 95%CI 0.53-0.85; p = 0.001).

For $p < 0.05$, multiple logistic regression analysis confirmed: work in a public institution (OR = 5.83; 95% CI 2.08-16.32; p = 0.001), work in a factory (OR = 0.2; 95% CI 0.06-0.68; p = 0.010) and regular meals per week (OR = 0.73; 95% CI 0.56-0.95; p = 0.018) were independent significant predictors of moderate/ severe depression.

DISCUSSION

This study found a significantly higher proportion of people with moderate and severe depression (PHQ-9 ≥ 10) in the public administration respondents compared to the other two groups. The data supported the hypothesis that work in public institutions represents an objective source of more stress and could encourage the appearance of depressive symptoms. Also, the financial and administrative factors, the more formal and unfriendly environment, lack of motivation and control over workplace decision-making, greater social and political pressure on the institutions are probably influential. Several studies report that the symptoms of depression may be correlated with work characteristics [16]. Similarly to our results, there is a study which compared depression status between office and manufacturing jobs, where significantly higher prevalence was found in the office employees. Depression prevalence rate that was estimated at 38% was much higher than that reported in a finding about depression among gas (18%) and oil (16%) industry workers in another study [17, 18]. Some other study illustrated that 32% of bank employees had depressive symptoms and could therefore potentially be considered clinically depressed [19]. The presence of physical activity in our study was not a protective factor in different groups that do not differ from each other. But lack of physical activity was an unfavorable factor for the participants from the public group that may lead to significantly higher levels of depression. Previous data indicated that respondents, who exercised and participated in a behavior modification program, significantly reduced their depression outcomes compared to those who did not participate in the program [20].

Our study illustrated that the degree of depression correlated with reduced sleep and irregular meals. There is a bi-directional relationship between sleep disturbance and depression. Although disturbed sleep is associated with many factors, including the professional environment, and has traditionally been considered as a symptom of depression, world data suggest that the relationship may work in the other

Table 4. Parameters with significant predictive role for PHQ-9 score-univariate logistic regression

		95% CI		
PHQ-9	**OR**	**lower**	**upper**	**P value**
Reference/others				
Public administration/others	7.494	3.017	18.615	0.001*
Factory workers/others	0.200	0.058	0.685	0.010*
Working experience	1.046	1.008	1.085	0.017*
Regular meals per week (N)	0.673	0.535	0.847	0.001*

Depended variable: PHQ – 9 score (≥ 10 vs. < 10)

Significant * P < 0.05

direction as well [21, 22]. In addition to being a symptom, it may also be a contributing factor to the development of mood disorders including depression. Working hours also affect the quality and duration of sleep [23]. The increase in working hours was proportional to the stress levels, i.e. more work led to higher observed stress levels and depression tends to increase [24]. The occurrence of depressive symptoms could be linked to the working experience as showed in the present study. Respondents with longer working experience were expected to have reduced levels of tolerance, as well as defense mechanisms and experience the negative impact of the work-related stressors, including lack of motivation and lack of effort at work.

Working in a public institution increased the risk of developing intense depressive symptomatology nearly 7.5 times. This tendency was maintained and reduced to 6 times by multiple regression analysis. Regular meals reduced the probability for depression 0.7 times that was retained as an inclination. However, working experience was not found to be associated with a higher probability of depression.

There is an association between the presence of depressive symptoms and recovery time after work activity. Such symptoms are eight times more common in the group of workers with a high need for recovery than workers with less need for recovery [25]. It was assumed that there was a link between the recovery period and working conditions in our study as well. Early indicators of depression in workers need to be identified in order to maintain depression prevention programs.

Our results suggested that there was an association between irregular meals and the occurrence of depression. That was in agreement with a study demonstrating that skipping breakfast increases the risk of depressive symptoms, even after adjusting for other dietary factors for decreasing the depressive symptoms [26, 27]. Irregular eating was probably associated with a busier (not necessarily longer), more stressed working day and could be a predictor of subsequent depression.

The results in terms of alcohol consumption rather reflected cultural attitudes. People working in the public sector, who were experiencing depressive symptoms did not “look” for the hedonistic effect of social communication and alcohol as a mediator. We supported the hypothesis that the levels of control as well as other coping mechanisms, were related. Data on this issue are limited. Future prospective studies are necessary to confirm our supposition.

Surprisingly, family people were more depressed, which was probably a reflection not only of professional but also of family commitments, exposure to a double load, having to dedicate themselves to both work and family, which were very likely to be perceived as a “burden” for those working in public institutions.

Our sample showed an absence of somatic diseases in the group of public workers with depression. On the contrary, many studies have illustrated the impact of depression on somatic development [28]. Dysregulated homeostatic biological pathways in depressed patients could contribute to higher frequency of somatic illnesses. In many cases, patients were subjected to costly and time-consuming investigations to determine whether organic conditions underline their symptoms. The inability to recognize somatic symptoms or their “true” nature is associated with significant health care expenditure [29]. In addition, the depressed patient’s tendency to attribute unexplained somatic symptoms to a pathologic cause, rather than to a psychological cause, is a principal driver in misdiagnosis [30].

This study has some limitations. First, it is possible that there was a participation bias in the study, and workers who were influenced by some aspects of the personality as well as those with a higher perception of illness, may had an impact in increasing the distribution of depression. Second, the direction of the relationship between depressive symptoms, and psychosocial parameters could not be accurately determined due to the cross-sectional design and also there was no possibility to monitor the changes in depressive symptoms over time. Like any cross-sectional research, this study did not identify causal directions among variables. Future research is necessary to determine the real association between depression and its causing factors. Additionally, PHQ-9 is an instrument for depressive symptoms screening in population studies, but diagnosing depression as a clinical disease requires confirmation from a psychiatrist.

CONCLUSION

This study discovered a relatively high prevalence of depression among private administration workers, factory workers, and especially in public administration where every fourth person had moderate/severe depression identified with PHQ-9. In addition, the correlation of demographic characteristics, working conditions, lifestyle parameters and current illnesses were investigated. The findings suggested the importance of regular health screening, work safety, and social support inside/outside of the workplace on the mental health of the workers. Screening in the work-

ing population allows contact with individuals who are suffering from symptoms of depression but are not aware of the disease or do not have the will to seek medical treatment.

The use of a structured questionnaire in this study allows for replication of the research and provides a point of reference that may benefit in future studies.

We found that the prevalence of minimal, mild, moderate, and moderately severe depression according to the total PHQ-9 score in all respondents was 70.97%, 18.15%, 6.85% and 4%, respectively. The group (public, factory), length of work experience and eating habits were associated with depression symptoms. Measures to improve the mental health and working conditions in the administration and factory industries need to be considered.

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