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Depression in Public Servants of Upper Egypt: Gender-specific Prevalence and Determining Factors

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Abstract

Mental health disorders, including depression, cause more than half of worldwide disabilities. We aimed to estimate the prevalence of depression and determine its associated factors among Egyptian public servants. We collected data from 3134 subjects (1619 females and 1515 males) via a self-administered questionnaire, including the Center of Epidemiological Studies-Depression (CES-D) scale, medical history, sociodemographic, familial, occupational, and behavioral characteristics of the recruited Egyptian Public servants. We used logistic and linear regression models to assess the determinants of depression. The prevalence of depression was 43.5% (52.9% in females and 33.4% in males) among public servants. The past history of depression was a significant determining factor of depression; adjusted odds ratio (aOR): 95% confidence interval (CI) was 2.58 (1.87, 3.57) in females and 3.28 (2.20, 4.87) in males. Other determinants were daily working hours: aOR=1.11 (1.02, 1.19) and high job demands: aOR=2.19 (1.40–3.41) in males, and the high job control in females: aOR=0.51 (0.36, 0.73). With the past history of depression, job demands, job control, family structure, education level, and working status of the spouse predicted 41% of the total variance in the CES-D score in females; $R^2=0.41$; whereas job demands, family structure, job hours per day predicted 40% of in males; $R^2=0.40$. In conclusion, the determinants of depression varied by gender. Governmental interventions aiming to improve the work environment (job demands, control, and working hours) and individual responsibilities to improve the living arrangement and education level could help to curb the emerging risk of depression.

Keywords Depression · Gender · Determinants · Public servants · Egypt

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Introduction

Depression is one of the most prevalent mental and psychological health problems worldwide and contributes to more than half of the disabilities all over the globe (Friedrich 2017). High prevalence rates of depression were described among the working populations worldwide. The estimated prevalence rate of depression was 6.9% among workers in the European Union (Wittchen et al., 2011), ranging between 6.9 and 16.2% among workers of 55 industries in the US *(Wulsin et al.,2014)* and 5.7% among Japanese workers according to the 2nd survey of the World Mental Health Japan (Ishikawa et al., 2018). Critical issues regarding depression among the working populations include the high proportion of employees unaware that they have depression. Even aware employees fear declaring this fact for their carrier future or since their insurance is inadequate to cover the costs (Kobau et al., 2010).

Factors that could correlate with depression among the working population include stressful working environments and inadequate or unfair financial and moral rewards at work as work-related factors (Theorell et al., 2015). However, family demands, responsibilities, and living arrangements (Xiu-Ying et al., 2012; Ghanem et al., 2009), besides the worker's medical history (Shoukry, 2021), lifestyle (Sharp et al., 2020), and sociodemographic factors (Steel et al., 2014; Theorell et al., 2015) could play a role in developing depression.

According to the Global Burden of Disease (GBD) study, mental health disorders contributed to 5.6% of the total disease burden in the Eastern Mediterranean Region (EMR) between 1990 and 2013 (Charara et al., 2017). The estimated disability-adjusted life years (DALYs) due to mental disorders in the EMR middle-income countries, such as Egypt, was 1884 per 100,000 people, and depression accounted for most of these lost years. Moreover, the highest DALYs, 5344 /100,000, were observed in the working-age population (25–49 years) (Charara et al., 2017). In Egypt, with more than 27 million employed persons (The World Bank, 2021), data on the exact prevalence of depression or its contributing factors among public servants are very limited. The available evidence is either from non-representative or non-working samples; such as undergraduate students (Ibrahim et al., 2012), patients with chronic painful conditions (Shoukry 2021), older adults (Odejimi et al., 2020), and a preliminary national survey (Ghanem et al., 2009), or related to the COVID-19 pandemic (Arafa et al., 2021) which has its specific circumstances. For the Egyptian working population, one study estimated the prevalence of depression as 37.5% among 600 women working in family health units in 2015 (Kasemy et al., 2016). Another study reported it as 23.2% among 568 school teachers in 2017 (Desouky & Allam 2017).

Those two small-scale Egyptian studies and the previous worldwide literature (Steel et al., 2014; Theorell et al., 2015) suggested that the prevalence of depression is higher among female than male workers. Accordingly, to suggest preventive strategies and control measures that can curb the health, social, and productivity outcomes of depression, we aimed, in this study, to survey the gender-specific prevalence and determine the factors associated with depression among the Egyptian male and female public servants, including not only the work environment characteristics but also the family, medical, lifestyle and sociodemographic attributes.

Methods

Study design and population

This is a cross-sectional survey under the bilateral Egyptian-Japanese joint project to assess the health consequences of work-family conflicts among public servants. The details of this collaborative project and the Egyptian survey were given previously *(Eshak et al.,*2021*; Abdelrehim et al.,*2022*; Eshak et al.,*2022*)*. The research ethics committee of *the Faculty of Medicine, Minia University* approved the study protocol per the Helsinki Declaration as revised in 1989. Informed written consent was obtained from all participating public servants recruited in a convenience sample from randomly selected public service facilities in Minia Governorate between October 2019 and January 2020. In this randomization process, we prepared a list of all public service facilities in Minia, including central and local municipalities, health, educational, administrative, electricity, agricultural, social service facilities, etc. Then one or more facility of each public service was selected randomly to be visited.

Public servants received instructions and guidance at their workplace to respond to a self-administered questionnaire covering information on their physical and mental health status, demographic, family, and work characteristics. Out of 5000 invited public servants, 3143 were willing to participate. However, the current research article was based on a sample of 3134 public servants after excluding 9 participants who did not answer sufficiently, i.e., $\geq$ four missing items, to the Center of Epidemiological Studies-Depression 20-item scale (CES-D) *(*Radloff 1977*)* on the questionnaire.

The target variable (Depression)

In 1977, Radloff published a 20-item scale that estimates depressive symptoms such as poor appetite, crying spells, restless sleep, and feeling sad, lonely, fearful, etc., among caregivers; the CES-D *(*Radloff 1977*)*. Response options for each item ranged from 0 for "Rarely or none of the time, <1 day in the past week", 1 for "Some or little of the time, 1–2 days in the past week) ", 2 for "Moderately or much of the time, 3–4 days in the past week), and 3 for "Most or almost all the time, 5–7 days in the past week). The total score ranges from 0 to 60, with high scores indicating greater depressive symptoms. Later on, in 1997, Lewinsohn et al. suggested a cutoff CES-D score of 16 or more to identify subjects at risk for clinical depression *(*Lewinsohn et al., 1997). The psychometric properties of the Arabic version of the CES-D showed a high internal consistency; Cronbach's alpha=0.86 in females and 0.84 in males in a sample of Lebanese adults (Kazarian & Taher, 2010) and was 0.88 in a sample of United Arab Emirates females (Ghubash et al., 2000).

Other variables of the survey questionnaire

The participants were asked to fill in data about their sociodemographic characteristics such as age, gender (male or female), level of education (less than high school,

high school, vocational/junior college, or university and higher), type of occupation (technical/manual, clerical, or professional), household income (starting from <5000 EGP up to >20,000 EGP), marital status (married, divorced, widow(er), or single), and whether their spouses have a job (yes or no). Public servants were also asked about the structure of their families [(current co-inhabitants are: spouse, children, father, mother, other or alone) - multiple choices were allowed], the number of family members, the number of children in the family, and the level of perceived social support from the family (high or low). Factors related to the occupational environment were also collected, such as the number of daily working hours and the level of job demands by three yes/no questions (1-Do you feel like you have too much work allotted to you? 2-Do you know what is expected of you at work? and 3- Do you frequently have to deal with conflicts in the workplace?), job control by two yes/no questions (1- Are you allowed to solve work's urgent/unforeseen problems on your own? and 2- Are you involved /consulted in the decisions taken in your workplace?), social support at work (low or high), and whether the public servants were working overtime, night shifts, or in additional jobs (yes or no for each). In addition, the medical history of physician-diagnosed physical illness (hypertension, hyperlipidemia, diabetes, ischemic heart disease, stroke, or cancer) and depression were declared in yes/no answers. The participants' smoking habits (never, former, and current smokers) and physical activity (measured in metabolic equivalent of task units) were also estimated.

Statistical analysis:

All the analyses were conducted using the SAS software version 9.4 (SAS Institute Inc, Cary, NC, USA). The descriptive analysis of the collected data was described gender-specifically for public servants with and without depression (a CES-D score≥of 16 was the used cutoff) *(*Lewinsohn et al., 1997). The difference in the mean values and proportions of studied factors between the two groups of public servants was estimated and tested for its significance by the independent sample t-test and the Chi-square test.

We used the logistic regression analysis to estimate the odds ratios (ORs) and 95% confidence intervals (CIs) of having clinical depression in univariate models (containing one factor at a time) and an adjusted model (including all the significant factors in the univariate models simultaneously).

Because the CES-D scale was not validated in our population of public servants, and previous studies have indicated the possibility of using different cutoff points to identify individuals at risk of clinical depression with varying forms of the CES-D scale *(Kohout et al.,*1993*;* Lewinsohn et al., 1997; Ota et al., 2021; Radloff, 1977; *Torres,* 2012), we conducted several sensitivity analyses to guard against misclassifications of the participants. First, we used the continuous score of the CES-D 20-item scale as the dependent factor in gender-specific stepwise multiple linear regression analyses that contained all the hypothesized determinant factors. In that analysis, The SAS software was instructed to include the determinant variable in the model when its p-value was <0.1 and to keep it in the final model when its p-value was <0.05. Another sensitivity analysis was conducted using the short form of the CES-D

11-item scale instead of the full 20-item scale to assess the depressive symptoms. For this sensitivity analysis, a CES-D 11-item score>8 was used to define public servants at risk of clinical depression *(*Ota et al., 2021). Lastly, because depression is highly recurrent (Kupfer et al., 1996), in another sensitivity analysis, we excluded participants with a past medical history of physician-diagnosed depression from the analysis and re-conducted the logistic regression analyses.

Results

Among the recruited 3134 public servants (51.7% females and 48.3% males), the overall prevalence of clinical depression was 43.5% among Egyptian public servants. The prevalence rate was 52.9% and 33.4% in female and male subjects, respectively, using the 20-item CES-D scale (Table 1), while it was 43.1% overall, 50.7% in females, and 33.1% in males using the 11-item CES-D scale (Data not shown in tables).

Table 1 shows that among public servants with depressive symptoms, the proportion of public servants of both genders working additional jobs and night shifts, having high job demands and low job controls, with a medical history of chronic diseases and history of depression was higher; while the proportion of public servants receiving high social support from family or at work was lower when compared to those without depressive symptoms. Also, female public servants at risk of clinical depression, compared to females who were not at that risk, were younger, more likely to be single or married to a non-working spouse, living in a multigeneration family, and educated to a university level or more. On the other hand, male public servants at risk of clinical depression, compared to males not at risk, were younger, less likely to smoke and be married to a working spouse, and more likely to be single and live alone.

In the univariate logistic regression analyses, being married to a working spouse, having high job control, and social support from family and at work were inversely associated with the odds of having depressive symptoms; while living in a multigeneration family, working night shifts, or additional jobs, and having high job demands and a past history of depression were positively associated with odds of having depressive symptoms in public servants of both genders. Moreover, age and clerical work were inversely associated among females; whereas lower education levels, being single, and having a medical history of chronic diseases in females, and living alone and longer working hours per day in males were positively associated with the odds of having depressive symptoms (Table 2).

In reference to less-educated male public servants, the multivariable-adjusted OR (95%CI) of having depressive symptoms in those with higher education was 0.69 (0.49–0.98) for vocational education and 0.72 (0.51–1.03) for university or above education. Female public servants married to a working spouse had an adjusted OR=0.71 (0.53–0.95) in reference to those married to a non-working spouse. The daily working hours: adjusted OR=1.11 (1.02–1.19) and high job demands: adjusted OR=2.19 (1.40–3.41) in males, and the high job control in females: adjusted OR=0.51 (0.36–0.73) were associated with depressive symptoms. The past history

Table 1 Gender-specific participants' characteristics according to the presence of depressive symptoms[a]

	Total participants		P-value[b]	Female public servants		P-value[b]	Male public servants		P-value[b]
	No depression, n=1772	Depression, n=1362		No depression, n=763	Depression, n=856		No depression, n=1009	Depression, n=506	
Age, y	42.1±10.5	39.2±10.5	<0.001	39.7±10.2	37.3±10.0	<0.001	43.9±10.3	42.3±10.5	0.004
Urban residence, %	45.7	62.3	0.112	58.4	62.3	0.108	36.2	38.0	0.477
Education, %			0.002			0.005			0.303
≤High school	19.2	16.0		12.2	11.0		24.5	27.5	
Vocational	22.2	19.7		19.3	18.7		24.5	21.5	
University or above	58.6	64.3		64.5	70.3		51.0	51.0	
Occupation, %			0.091			0.069			0.519
Professional	54.2	61.2		63.3	68.4		47.3	49.0	
Cleric	31.5	25.5		25.7	21.3		35.9	32.6	
Manual or technical	14.3	13.3		11.0	10.3		16.8	18.4	
Household income, %			0.545			0.609			0.467
Lowest	23.5	24.1		24.9	24.7		22.5	23.3	
Middle	74.4	72.8		72.5	71.7		76.0	74.9	
Highest	2.1	3.1		2.6	3.6		1.5	1.8	
Smoking habit, %			0.073			0.322			0.051
Never	77.7	85.1		99.2	99.5		61.5	60.9	
Former	16.3	12.3		0.5	0.1		28.3	32.2	
Current	6.0	2.6		0.3	0.4		10.2	6.9	
Marital status, %			<0.001			0.012			<0.001
Single	8.9	15.6		12.2	17.3		6.5	12.7	
Divorced	1.4	2.4		2.1	3.1		0.8	1.3	
Widowed	2.8	3.2		5.4	4.7		0.8	0.8	
Married	86.9	78.8		80.3	74.9		91.9	85.2	
Working spouse, %	38.0	24.7	<0.001	35.3	20.9	<0.001	40.0	31.2	0.003

Table 1 (continued)

	Total participants		P-value[b]	Female public servants		P-value[b]	Male public servants		P-value[b]
	No depression, n=1772	Depression, n=1362		No depression, n=763	Depression, n=856		No depression, n=1009	Depression, n=506	
Type of family, %			0.004			0.009			<0.001
Nuclear	82.3	72.2		77.7	71.0		85.9	79.2	
Multigeneration	16.5	25.9		21.2	27.7		13.0	17.8	
Living alone	1.2	1.9		1.1	1.3		1.1	3.0	
Number of family members, n	3.6±1.9	3.3±1.9	0.123	3.1±1.8	2.9±1.9	0.029	3.9±1.8	3.8±1.9	0.189
Number of children in the family, n	1.2±1.3	1.1±1.3	0.379	1.1±1.3	1.0±1.2	0.187	1.4±1.4	1.3±1.4	0.248
Working hours, h/d	7.1±1.6	7.2±1.7	0.031	6.8±1.4	6.8±1.6	0.501	7.4±1.6	7.7±1.8	0.002
Night shift job, %	16.8	22.1	<0.001	12.5	19.7	<0.001	20.2	26.3	0.007
Additional work, %	25.1	29.7	<0.001	10.2	16.5	<0.001	43.0	48.0	0.064
High work demands, %	45.3	70.7	<0.001	44.3	69.3	<0.001	46.1	73.1	<0.001
Low job control, %	43.0	66.9	<0.001	38.4	65.2	<0.001	46.7	69.8	<0.001
High social support at work, %	61.3	40.7	<0.001	67.0	45.2	<0.001	57.0	33.2	<0.001
High social support at family, %	47.5	31.4	<0.001	49.7	33.1	<0.001	45.8	28.7	<0.001
Medical history of chronic disease, %	26.2	29.2	0.172	24.9	29.1	0.063	27.1	29.3	0.366
Past history of depression, %	6.7	18.7	<0.001	8.7	20.4	<0.001	5.3	16.0	<0.001

[a] CESD scores>=16 were used to define the group of public servants with depressive symptoms

[b] According to the independent sample t-test or the Chi-square test

Table 2 Univariate and adjusted odds ratios and 95% confidence intervals of depression according to the studied factors

	Female public servants		Male public servants	
	Univariate OR (95% CI)	Adjusted OR (95% CI)[a]	Univariate OR (95% CI)	Adjusted OR (95% CI)[a]
Age, y	0.98 (0.97, 0.99)*	0.99 (0.98, 1.00)	0.99 (0.98, 1.00)*	1.00 (0.98, 1.01)
Residence				
Rural (ref)	1.00		1.00	
Urban	0.85 (0.70, 1.04)		0.92 (0.74, 1.15)	
Education				
≤ High school (ref)	1.00	1.00	1.00	1.00
Vocational	1.44 (1.01, 2.04)*	1.24 (0.84, 1.82)	0.78 (0.58, 1.07)	0.69 (0.49, 0.98)*
University or above	1.61 (1.20, 2.16)*	1.35 (0.92, 1.98)	0.89 (0.70, 1.15)	0.72 (0.51, 1.03)
Occupation				
Professional (ref)	1.00	1.00	1.00	1.00
Cleric	0.77 (0.61, 0.97)*	0.99 (0.73, 1.33)	0.88 (0.69, 1.11)	0.78 (0.59, 1.02)
Manual or technical	0.86 (0.63, 1.19)	1.03 (0.67, 1.58)	1.06 (0.79, 1.42)	0.77 (0.52, 1.14)
Household income, %				
Lowest (ref)	1.00		1.00	
Middle	1.00 (0.80, 1.26)		0.95 (0.74, 1.23)	
Highest	1.24 (0.63, 2.43)		1.44 (0.59, 3.52)	
Smoking habit				
Never (ref)	1.00		1.00	
Former	0.22 (0.03, 1.99)		1.15 (0.91, 1.46)	
Current	1.33 (0.22, 8.00)		0.69 (0.46, 1.03)	
Marital status				
Married (ref)	1.00	1.00	1.00	1.00
Divorced	1.61 (0.86, 3.03)	1.33 (0.54, 2.24)	1.88 (0.68, 5.22)	2.16 (0.66, 7.11)
Widowed	0.93 (0.60, 1.46)	0.81 (0.38, 1.73)	1.08 (0.32, 3.59)	1.52 (0.40, 5.71)
Single	1.52 (1.15, 2.02)*	0.81 (0.41, 1.59)	2.09 (1.45, 3.00)*	1.52 (0.80, 2.84)
Working spouse				
No (ref)	1.00	1.00	1.00	1.00
Yes	0.48 (0.39, 0.60)*	0.71 (0.53, 0.95)*	0.68 (0.54, 0.85)*	0.86 (0.66, 1.12)
Type of family				
Nuclear (ref)	1.00	1.00	1.00	1.00
Multigeneration	1.43 (1.13, 1.80)*	1.54 (0.84, 2.82)	1.49 (1.11, 1.99)*	1.11 (0.69, 1.79)
Living alone	1.34 (0.54, 3.36)	1.95 (0.64, 6.00)	2.95 (1.34, 6.47)*	2.18 (0.83, 5.78)
Number of family members	0.94 (0.89, 0.99)*	0.96 (0.90, 1.02)	0.96 (0.91, 1.02)	1.01 (0.94, 1.09)
Number of children in the family	0.95 (0.88, 1.03)		0.96 (0.88, 1.03)	
Working hours, h/d	1.02 (0.96, 1.09)		1.12 (1.06, 1.20)*	1.11 (1.02, 1.19)*
Job nature				
No night shifts (ref)	1.00	1.00	1.00	1.00
Night shifts	1.73 (1.32, 2.27)*	1.15 (0.82, 1.62)	1.41 (1.10, 1.81)*	0.96 (0.70, 1.32)
Additional work				
No (ref)	1.00	1.00	1.00	1.00
Yes	1.73 (1.29, 2.33)*	1.27 (0.91, 1.76)	1.22 (0.99, 1.52)	1.00 (0.78, 1.27)

Table 2 (continued)

	Female public servants		Male public servants	
	Univariate OR (95% CI)	**Adjusted OR (95% CI)ᵃ**	**Univariate OR (95% CI)**	**Adjusted OR (95% CI)ᵃ**
Job demands				
Low (ref)	1.00	1.00	1.00	1.00
High	2.84 (2.32, 3.48)*	1.33 (0.94, 1.89)	3.18 (2.52, 4.02)*	2.19 (1.40, 3.41)*
Job control				
Low (ref)	1.00	1.00	1.00	1.00
High	0.33 (0.27, 0.41)*	0.51 (0.36, 0.73)*	0.37 (0.30, 0.48)*	0.84 (0.57, 1.22)
Social support at work				
Low (ref)	1.00	1.00	1.00	1.00
High	0.41 (0.33, 0.50)*	0.77 (0.57, 1.03)	0.38 (0.30, 0.47)*	0.85 (0.59, 1.21)
Social support at family				
Low (ref)	1.00	1.00	1.00	1.00
High	0.50 (0.41, 0.61)*	0.88 (0.58, 1.60)	0.48 (0.38, 0.60)*	0.92 (0.68, 1.25)
Medical history of chronic disease				
No (ref)	1.00	1.00	1.00	1.00
Yes	1.24 (1.00, 1.54)*	1.38 (1.07, 1.79)*	1.12 (0.88, 1.41)	1.06 (0.81, 1.38)
Past history of depression				
No (ref)	1.00	1.00	1.00	1.00
Yes	2.72 (2.10, 3.68)	2.58 (1.87, 3.57)*	3.35 (2.39, 4.59)*	3.28 (2.20, 4.87)*

* p-value < 0.05 indicating a significant association

ᵃ Adjusted ORs: 95%CIs were estimated by a logistic regression model that simultaneously contained all the significant variables in the univariate analyses (variables that did not reach the level of statistical significance in the univariate analyses were excluded from the multivariable-adjusted model)

of physician-diagnosed depression was a highly significant determining factor of depressive symptoms; Adjusted OR (95%CI) was 2.58 (1.87–3.57) in females and 3.28 (2.20–4.87) in males (Table 2).

The sensitivity analyses using the CES-D 11-item scale (**Supplemental Table I**) and excluding 375 participants with a past history of physician-diagnosed depression (**Supplemental Table II**) showed similar results.

The stepwise multiple linear regression analysis confirmed that job demands, job control, family structure, education level, working status of the spouse, and history of depression collectively could predict 41% of the total variance in the CES-D score in females; R^2=0.41(Table 3). On the other hand, among male public servants, job demands, family structure, job hours per day, and history of depression collectively could predict 40% of the total variance in the CES-D score; R^2=0.40 (Table 4).

Table 3 Stepwise multiple linear regression[a] for factors predicting the depressive symptoms CES-D score among female Egyptian public servants

Variables	Male public servants			
	B	**SE**	**95% CI**	**Standardized β**
High job demands	0.09	0.04	0.02, 0.17	0.09
High job control	-0.17	0.04	-0.24, -0.09	-0.17
Family structure	0.09	0.03	0.04, 0.14	0.08
Education	0.04	0.02	0.01, 0.07	0.05
Working spouse	-0.06	0.03	-0.12, -0.01	-0.12
Medical history of depression	0.21	0.03	0.14, 0.27	0.15

[a]The stepwise linear regression started with a model including age, residence, education, occupation, working hours per day, job nature, additional work, job demands, job control, social support at work, household income, smoking habit, marital status, a working spouse, type of family, number of family members, number of children in the family, social support at family, medical history of chronic diseases, and past history of physician-diagnosed depression

The R^2 of the final model $= 0.41$

Table 4 Stepwise multiple linear regression[a] for factors predicting the depressive symptoms CES-D score among male Egyptian public servants

Variables	Male public servants			
	B	**SE**	**95% CI**	**Standardized β**
High job demands	0.22	0.02	0.17–0.27	0.23
Family structure	0.09	0.03	0.03–0.14	0.08
Job hours per day	0.02	0.01	0.01–0.04	0.08
Medical history of depression	0.26	0.04	0.18–0.34	0.16

[a]The stepwise linear regression started with a model including age, residence, education, occupation, working hours per day, job nature, additional work, job demands, job control, social support at work, household income, smoking habit, marital status, a working spouse, type of family, number of family members, number of children in the family, social support at family, medical history of chronic diseases, and past history of physician-diagnosed depression

The R^2 of the final model $= 0.40$

Discussion

The findings of this cross-sectional study among 3134 Egyptian public servants revealed a high total prevalence of depression (43.5%), and the prevalence was higher among female employees; 52.9% than male ones; 33.4%. The factors associated with this high prevalence differed by gender as well. Job control, education level, and working status of the spouse were determinants of depressive symptoms among female public servants, while job hours per day were one of the depression determinants among male public servants. Else, common factors determining the depressive symptoms among both genders were the history of depression, job demands, and family structure.

The previous studies reported a varied range of prevalence of depression among Egyptians of working age. As early as the 1980s, Okasha et al., (1988) estimated it

to be 15.3% in the 1980s in a sample of urban and rural Egyptians. In the 1990s, the prevalence was 11% in 300 adults from Alexandria (Khatwa & Abdou 1999) and 22.8% (9.7% in males and 33.2% in females) in 325 adults in rural Minia (Soliman et al., 1997). Later on, in 2003, Ghanem et al., (2009) started a national study to assess the prevalence of mental disorders in Egypt. Based on the preliminary data of the first step of that national study, which included 14,640 Egyptians aged 18–64 years from Lower Egypt, the prevalence of depression was 6.4%. Unfortunately, the second phase of Ghanem et al.' study, which was planned to cover Upper Egypt, has not been conducted yet. More recently, but in smaller samples, a depression prevalence of 37.5% was reported among 600 family health female workers in 2015 (Kasemy et al., 2016), 23.2% (16.1% in males and 28.3% in females) among 568 school teachers in 2017 (Desouky & Allam 2017), and 6.7% (5.8% in males and 7.2% in females) among 1021 community dwellers in 2019 (Eshak, 2019).

Moreover, our estimated prevalence of depressive symptoms among Egyptian public servants was comparable to those reported in some but not all countries in the EMR, regardless of the working status of the recruited samples (mainly based on primary health care attendees or general populations). The estimated prevalence was 46% (43% in males and 57% in females) among 820 Pakistani in 2006 (Muhammad and Mugford, 2007), 43.1% among 850 Saudi aged 18–80 years in 2014 (Al-Dabal et al., 2015), and 70.6% among 136 Syrian females aged 18–50 years in 2017 (Sharp et al., 2020). On the other hand, a far lower prevalence was reported in other EMR countries; 4.1% (2.3% in males and 4.8% in females) pooled prevalence in Iranians (Gharraee et al., 2019), 5.6% among 300 Bahraini adults in 2006 (Al Ansari et al., 2010), 13.4% among 134 Tunisian adults in 2017 (Belhadj & Jomli 2017), 17.7% among 5498 subjects aged above 15 years in a Moroccan national study in 2004–2005 (Oneib et al., 2015), 18.3% (13.8% in males and 22.0% in females) among 1475 Qutari aged 18–65 years in 2011/2012 (Bener et al., 2015), 22.9% (12.1% in males and 30.5% in females) among 1046 Kuwaitis aged above 18 years in 2016 (Alkhadhari et al., 2016), 27.8% (20% in males and 30% in females) among 658 Lebanese aged 18–65 years in 1992 (Karam et al., 1998), and 12.5–28.6% among residents in UAE according to a systematic review of studies published between 2007 and 2017 (Razzak et al., 2019). The discrepancies in the reported prevalence across countries could be attributed to different diagnostic and screening tools for depressive symptoms, heterogeneous characteristics of the recruited participants, variations in the years or periods of estimation, and inconsistencies in the study design and sampling method.

In our study, a higher proportion of Egyptian females than male public servants reported depressive symptoms. This finding was in a match with the previous global literature Steel et al., 2014; Theorell et al., 2015), especially in the EMR (Charara et al., 2017; Gharraee et al., 2019; Razzak et al., 2019) and North Africa (Belhadj & Jomli 2017; Ghanem et al., 2009; Oneib et al., 2015). Besides their job commitments, female public servants' multiple roles as caregivers (spouses, mothers, grandmothers) could exhaust them physically and psychologically. Moreover, studies in the EMR suggested polygamy, violence against women, and postpartum depression attributing factors to the high prevalence of depression in females (Charara et al., 2017; Ghanem et al., 2009).

The gender difference presented itself with a higher prevalence among females and with variable determining factors according to gender. First, consistent with the previous studies' findings, high job demands were associated with increased odds of depression in both genders (Desouky & Allam 2017; Kasemy et al., 2016; Theorell et al., 2015); however, high job control was associated with reduced odds of depression in females only. Gender discrimination at work is deeply rooted in the Egyptian culture (Jayachandran 2014); thus, it is uncommon for female public servants to have autonomy in their jobs or make decisions independently without asking for direction. Having such job control traits could improve the mental health status of female public servants (Theorell et al., 2015). Second, despite the abundant evidence on the inverse association between education and depression (Chang-Quan et al., 2010), higher education levels were associated with a higher prevalence of depression among females in our study. Desouky & Allam (2017) pointed out that Egyptian female teachers with high qualifications (University degree or more) had a 1.58 (1.38–1.89) increased odds of depression compared to less-educated ones. This might be attributed to higher mental job demands or less job satisfaction experienced by highly educated female public servants in Egypt. Third, being married to a working spouse was associated with a low likelihood of depression among the studied female but not male public servants. This was in line with the case for Syrian females (Sharp et al., 2020). It is typical in Egyptian and Arab societies to find a working husband married to an unemployed wife; however, the work-life balance will be very stressful for employed females married to unemployed husbands (Kasemy et al., 2016; *Desoky an Allam, 2017)*.

Longer daily working hours were associated with prevalent depression among male but not female public servants. This finding supports the previous results that the work environment significantly impacted the psychological health of males, contrary to that of females, which was influenced mainly by the family *(Kobayashi et al.,2017; Eshak,2019;* Theorell et al., 2015). In this regard, the family structure in our study was associated with depression in both genders. A meta-analysis of 25 (19 cross-sectional and six longitudinal) studies estimated the pooled OR (95% CI) of depression in individuals living alone as a 1.44 (1.04–1.99), and that for living in large families was 2.59 (1.60–4.20) (Xiu-Ying et al., 2012). In their preliminary Egyptian national survey, Ghanem et al., (2009) indicated that a crowding index > 3 was associated, especially in females with an OR of depression = 1.26 (1.13–1.41).

The most potent factor associated with depressive symptoms in our study was the history of physician-diagnosed depression. This is very consistent with the previous findings (Al Ansari et al., 2010; Al-Dabal et al., 2015; *Eshak,2019;* Razzak et al., 2019) and very plausible as well. It is well-established that depression is highly recurrent. An additional episode of depression usually occurs in more than 50% and 80% of those who recover from a first and a second episode, respectively (Kupfer et al., 1996).

This is the first study to investigate the prevalence and determinants of depression among Egyptian public servants who drive life and work in Egypt. Strengths of the current study include the reasonable sample size, which allowed gender-specific analyses and representation of different sectors of workers in the public service, and the study of a wide range of sociodemographic, occupational, familial, behavioral, and

medical determinants of depression. On the other hand, critical limitations should be declared. First, the convenience sampling technique and the study's cross-sectional design hindered us from driving any causal inference and limited the generalization of the study findings, especially to Lower Egypt or private sectors. A review of the state, policy, and needs of mental health care in Egypt pointed to a higher prevalence of mental disorders in Cairo than in other sites in Egypt (Fawzy 2017). Moreover, the convenience sampling has let more female and highly educated public servants respond to the research questionnaire, which does not necessarily imply higher proportions of female and highly educated public servants than male and moderate/less educated ones in Egypt. Last, the analyses were based on self-reported data, which could bear some inevitable misclassifications. However, we used the CES-D, an internationally valid tool to assess depressive symptoms. In addition, we examined the estimated prevalence by two CES-D forms, the 20-item, and the 11-item, with consistent prevalence estimations.

In conclusion, depressive symptoms were prevalent in Egyptian public servants of both genders, with an exacerbating rate in females. Factors associated with the development of depressive symptoms differed by gender as well. For the potential preventive interventions and public policy implications of our findings, we recommend organizational measures to reduce the job demands, enhance female public servants to gain more job control, and apply flexibility to the working hours of male public servants to reduce the odds of depression and its health consequences at the individual level and work productivity at the organizational level. Moreover, psychological counseling and providing help for public servants with a history of depression could be preventive measures against the recurrence of depression. On the other hand, public servants should pay attention to their living arrangements and family structure.

Declarations

Conflict of interest The authors declare no conflict of interest.

Ethics The Faculty of Medicine Research Ethics Committee (FMREC), Minia University approved this study (approval no 194:4/2019).

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