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Prevalence and Predictors of Depression Among Medical Residents in Western Saudi Arabia

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Abstract
There is evidence of a higher depression rate among resident physicians compared to the general population. This study aimed to estimate the prevalence of depression and assess its severity and predictors among physician residents in Jeddah, Western Saudi Arabia. A cross-sectional survey was conducted using the self-administered Patient Health Questionnaire (PHQ-9). This study included 149 medical residents. More than half (53%) were female and 43% were married. A diagnosis of depression (mild to severe) was identified in 75.8% of the participants (mild in 35.6%, moderate in 34.2%, and severe depression in 6.0%). Residents in surgery and emergency programs were at an increased risk for moderate-to-severe depression (OR 2.60, 95% CI 1.13, 5.98; OR 4.90, 95% CI 1.08, 22.20; respectively). Mental health programs for resident physicians would facilitate the early detection of depression and mental disorders. However, adequate mentoring, managing workloads, and social off-duty activities are always vital.

Keywords Depression · Medical residents · Prevalence

Background

Depression is the leading cause of disability worldwide in terms of total years lost due to disability (DALYs) (WHO, 2017). According to the World Mental Health Survey conducted in 17 countries, about 1 in 20 people reported having an episode of depression in the previous year (Marcus, Yasamy, van Ommeren, & Chisholm, 2012). Depression is a common mental health disorder that presents with depressed mood, loss of interest or pleasure, decreased energy, feelings of guilt or low self-worth, disturbed sleep or appetite, and poor concentration (Marcus et al., 2012).

During medical residency (4–5 years), graduated medical students are exposed to many stressors (Alosaimi, Kazim, Almufleh, Aladwani, & Alsubaie, 2015), including patient care responsibilities and the need to study for their future careers. There is evidence that these stressors are associated with symptoms of depression (Alosaimi et al., 2015; Mata, Ramos, Bansal, Khan, Guille, Di Angelantonio, & Sen, 2015). The prevalence of depression among physician residents varied from 3 to 63% according to the applied methodology and measures (Mata et al., 2015; Buddeberg-Fischer, Klaghofer, & Buddeberg, 2005; Yousuf, Ishaque, & Qidwai, 2011; Al-Maddah, Al-Dabal, & Khalil, 2015). A study among American surgeons reported that 6.3% had suicidal ideation (SI), and despite that, few sought psychiatric or psychological help (Fahrenkopf, Sectish, Barger, Sharek, Lewin, Chiang, & Landrigan, 2008).

Factors that contribute to depression among physician residents also varied between studies. A cross-sectional study among physicians working in Japan concluded that a depressive state was associated with an increasing number of on-calls (Fahrenkopf et al., 2008). In Eastern Saudi Arabia, work-related stressors and sleep deprivation were associated with depression among medical residents (Al-Maddah et al., 2015).

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The impact of depression among physicians is not limited to their health and well-being but could affect their patients as well. Depressed physicians are unable to fulfill professional or personal responsibilities, they use more sick days, and they are at risk of low job performance (Fahrenkopf et al., 2008; Druss, Rosenheck, & Sledge, 2000; Baldisseri, 2007). A study on pediatric residents showed that depressed individuals are six times more liable to commit medication errors than nondepressed persons, which is a potential threat to patient safety (Fahrenkopf et al., 2008).

Depression is a significant problem that could be well addressed through mental health assessment and prompt management (Goebert, Thompson, Takeshita, Beach, Bryson, Ephgrave, & Tate 2009). Studies that assess this problem among medical residents in Saudi Arabia are lacking despite the increasing number of physician residents each year. Accordingly, the current study was conducted to estimate the prevalence of depression and assess its associated factors among physician residents in Jeddah City, Western Saudi Arabia.

Methods

Study Setting

This study was conducted on medical residents completing their training programs at King Abdulaziz Medical City (KAMC), Ministry of National Guard Health Affairs, Jeddah. KAMC-J is a 500-bed tertiary care hospital that serves National Guard employees and their families and has a well-established residency program in collaboration with the Saudi Commission for Health Specialties.

Study Design and Data Collection

A cross-sectional survey was done using the self-administered PHQ-9, a 9-item depression module of the full Patient Health Questionnaire (PHQ). The full PHQ is an instrument for the diagnosis of depressive and other mental disorders commonly encountered in primary care settings. The PHQ-9 is a reliable and valid tool, not only to establish a depressive disorder diagnosis but also to grade depressive symptom severity. The PHQ's diagnostic validity was established in the literature (Kroenke, Spitzer, Williams, & Löwe, 2010; Arroll, Goodyear-Smith, Crengle, Gunn, Kerse, Fishman, & Hatcher, 2010). It has a high sensitivity (88%, 95% CI 74–96%) and specificity (88%, 95% CI 85–90%) for diagnosing major depressive disorder and is viewed as comparable with clinician-administered assessments (Mata et al., 2015).

Scores for each item of the PHQ-9 range from 0 (not at all) to 3 (nearly every day). Scores of 5, 10, 15, and 20 represent the cut-off points for mild (5–9), moderate (10–14), moderately severe (15–19), and severe depression (20–27), respectively.

Demographics were collected on age, gender, marital status, having children, having chronic medical condition, specialty, level of residency, and on-call duty.

Questionnaires were distributed using anonymous return envelopes during each specialty's weekly academic day or after morning meeting.

Statistical Analysis

Data were analyzed using IBM SPSS software version 24. Univariate and multivariate regression analyses were applied to identify the risk factors associated with depression among the study participants. A logistic regression analysis was performed. The Odds Ratio (OR) and 95% confidence interval (CI) were estimated. A χ^2 test was used to assess the association of different risk factors and depression severity. The level of significance was determined at .05.

Results

This study included 149 medical residents who completed the questionnaire (response rate was 72.8%). More than half the participants (51.0%) were 26 years old or younger, 53% were female, 43% were married, and 19.5% had children.

Chronic medical conditions were reported among 14.8% of the participants. There were 27 medical problems identified by 22 residents (5 residents reported more than 1 problem). The most frequent medical problem was bronchial asthma ($n=5$, 3.4%) followed by migraine headache ($n=3$, 2.01%). Other medical conditions included allergic rhinitis ($n=2$), dermatitis ($n=2$), hypertension ($n=2$), hypothyroidism ($n=2$), polycystic ovary syndrome ($n=2$), gastroesophageal reflux disease ($n=1$), anxiety, arthralgia ($n=1$), depression ($n=1$), diabetes mellitus ($n=1$), dyslipidemia ($n=1$), irritable bowel syndrome ($n=1$), and sick sinus syndrome ($n=1$).

More than half the participants (53.7%) were in nonsurgery programs, 38.9% were in surgery programs, and 7.4% were in emergency medicine programs.

Participants were distributed through the different levels of the residency program, from R1–R5 (32.9%, 26.2%, 21.5%, and 19.5%, respectively). One-third of the participants (22.8%) reported that they did not have on-calls (Table 1).

Using the PHQ-9, a diagnosis of depression (mild–severe) was identified in 75.8% of the participants (Table 1).

Using a multivariate regression analysis, being unmarried, having a chronic medical condition, and being at a higher residency level (R4) were significant risk factors for depression (mild–severe) (OR 2.81, 95% CI 1.13, 7.01; OR

Table 1 Risk factors associated with depression among the study participants

Variable	Depression		Adjusted OR (95% CI)	*p* value
	Yes (mild–severe) (*n* = 113; 75.8%) *N* (%)	No depression (*n* = 36; 24.2%) *N* (%)		
Age				
≤ 26 years (*n* = 76, 51.0%)	55 (72.4)	21 (27.6)	1	
> 26 years (*n* = 73, 49.0%)	58 (79.5)	15 (21.7)	.95 (.33, 2.69)	.92
Gender				
Female (*n* = 79, 53.0%)	62 (78.5)	17 (21.1)	1.50 (.63, 3.61)	
Male (*n* = 70, 47.0%)	51 (72.9)	19 (27.1)	1	.36
Marital status				
Single (*n* = 85, 57.0%)	68 (80.0)	17 (20.0)	2.81 (1.13, 7.01)	.03
Married (*n* = 64, 43.0%)	45 (70.3)	19 (29.7)	1	
Children				
No (*n* = 120, 80.5%)	90 (75.0)	30 (25.0)	1	
Yes (*n* = 29, 19.5%)	23 (79.3)	6 (20.7)	1.26 (.31, 5.16)	.75
Have medical problem				
No (*n* = 127, 85.2%)	92 (72.4)	35 (27.6)	1	
Yes (*n* = 22, 14.8%)	21 (95.5)	1 (4.5)	9.45 (1.12, 80.05)	.04
Specialty				
Nonsurgery (*n* = 80, 53.7%)	55 (68.8)	25 (31.3)	1	
Surgical (*n* = 58, 38.9%)	44 (81.0)	11 (19.0)	1.46 (.61, 3.50)	.40
Emergency (*n* = 11, 7.4%)	11 (100)	0 (.0)	–	–
Level of residency				
R1 (*n* = 49, 32.9%)	34 (69.4)	15 (30.6)	1	
R2 (*n* = 39, 26.2%)	30 (76.9)	9 (23.1)	2.14 (.75, 6.13)	.16
R3 (*n* = 32, 21.5%)	23 (71.9)	9 (28.1)	1.86 (.61, 5.69)	.28
R4 (*n* = 29, 19.5%)	26 (89.7)	3 (10.3)	6.14 (1.31, 28.93)	.02
Have on-calls				
No (*n* = 34, 22.8%)	25 (73.5)	9 (26.5)	1	
Yes (*n* = 115, 77.2%)	88 (76.5)	27 (23.5)	1.09 (.36, 3.29)	.88
Number of on-calls/week				
≤ 5 (*n* = 109, 73.2%)	80 (73.4)	29 (26.6)	1	
> 5 (*n* = 40, 26.8%)	33 (82.5)	7 (17.5)	2.03 (.74, 5.58)	.17

9.45, 95% CI 1.12, 80.05; OR 6.14, 95% CI 1.31, 28.93; respectively) (Table 1).

Mild depression was identified in 35.6% of the participants, moderate depression in 34.2%, and severe depression in 6%. Being in an emergency program was associated with a higher risk of severe depression ($p = .01$) (Table 2).

This finding was supported by the multivariate regression analysis, where residents in surgery and emergency programs were at a higher risk for moderate/severe depression (OR 2.60, 95% CI 1.13, 5.98; OR 4.90, 95% CI 1.08, 22.20; respectively). Moreover, medical residents in higher years showed a lower risk for severe depression, although a statistical difference was only observed among R3 residents (Table 3).

Discussion

Depression has negative consequences not only on a physician's physical health and quality of life but also on the quality and safety of patient care (Fahrenkopf et al., 2008; West, Tan, Habermann, Sloan, & Shanafelt, 2009). There is evidence that resident physicians have a higher depression rate compared to the general population despite having better access to mental health care (Sen, Kranzler, Krystal, Speller, Chan, Gelernter, & Guille, 2010; Schwenk, 2015).

The current study revealed a high prevalence of depression among medical residents compared to previously

Table 2 Distribution of the participants according to depression severity

Variable	Depression severity			*p* value
	Mild (*n* = 53; 35.6%) *N* (%)	Moderate (*n* = 51; 34.2%) *N* (%)	Severe (*n* = 9; 6.0%) *N* (%)	
Age				
≤ 26 years (*n* = 55, 48.7%)	28 (50.9)	23 (41.8)	4 (7.3)	.71
> 26 years (*n* = 58, 51.3%)	25 (43.1)	28 (48.3)	5 (8.6)	
Gender				
Female (*n* = 62, 54.9%)	24 (38.7)	31 (50.0)	7 (11.3)	.10
Male (*n* = 51, 45.1%)	29 (56.9)	20 (39.2)	2 (3.9)	
Marital status				
Single (*n* = 68, 60.2%)	26 (38.2)	35 (51.5)	7 (10.3)	.07
Married (*n* = 45, 39.8%)	27 (60.0	16 (35.6)	2 (4.4)	
Children				
No (*n* = 90, 79.6%)	42 (46.7)	40 (44.4)	8 (8.9)	.77
Yes (*n* = 23, 20.4%)	11 (47.8)	11 (47.8)	1 (4.3)	
Have medical problem				
No (*n* = 92, 81.4%)	45 (48.9)	42 (45.7)	5 (5.4)	.11
Yes (*n* = 21, 18.6%)	8 (38.1)	9 (42.9)	4 (19.0)	
Specialty				
Nonsurgery (*n* = 55, 48.7%)	33 (60.0)	20 (36.4)	2 (3.6)	.01
Surgical (*n* = 47, 41.6%)	17 (36.2)	26 (55.3)	4 (8.5)	
Emergency (*n* = 11, 9.7%)	3 (27.3)	5 (45.5)	3 (27.3)	
Level of residency				
R1 (*n* = 34, 30.1%)	13 (38.2)	19 (55.9)	2 (5.9)	.47
R2 (*n* = 30, 26.5%)	15 (50.0)	13 (43.3)	2 (6.7)	
R3 (*n* = 23, 20.4%)	14 (60.9)	8 (34.8)	1 (4.3)	
R4 (*n* = 26, 23.0%)	11 (42.3)	11 (42.3)	4 (15.4)	
Have on-calls				
No (*n* = 25, 22.1%)	13 (52.0)	11 (44.0)	1 (4.0)	.66
Yes (*n* = 88, 77.9%)	40 (45.5)	40 (45.5)	8 (9.1)	
Number of on-calls/week				
≤ 5 (*n* = 80, 70.8%)	36 (45.0)	39 (48.8)	5 (6.3)	.37
> 5 (*n* = 33, 29.2%)	17 (51.5)	12 (36.4)	4 (12.1)	

conducted studies (mild depression was identified in 35.6%, and moderate/severe depression was identified in 40.2% of the participants). A systematic review of the articles published between 1963 and 2015 on the prevalence of depression or depressive symptoms in interns, resident physicians, or both included 31 cross-sectional and 23 longitudinal studies (Mata et al., 2015). Only one of the studies was done in Saudi Arabia (Al-Maddah et al., 2015). That systematic review yielded a pooled summary prevalence of 28.8% with a range from 20.9 to 43.2% (Mata et al., 2015). Seven of the reviewed studies used the PHQ-9 and showed an estimated prevalence of 20.9%, using a cut-off of ten or more (moderate/severe depression). The other eight studies used the 2-item Primary Care Evaluation of Mental Disorders questionnaire (PRIME-MD) and showed an estimate of 43.2%. Other measures applied [i.e., the Beck Depression Inventory (BDI), the Center for Epidemiologic Studies Depression Scale (CES-D), the Zung Self-Rating Depression Scale (SDS), and the Harvard Department of Psychiatry/National Depression Screening Day Scale (HANDS)] identified different rates (Mata et al., 2015).

The prevalence of depressive symptoms in individual studies ranged from 9.8 to 63.2%. Interestingly, the highest estimate was by Al-Maddah et al., (2015) among medical residents at King Fahd University Hospital, Eastern Saudi Arabia (95% CI 55.5–70.4%) (9), which is even higher than our estimate, although both estimates from Eastern and Western Saudi Arabia are considered high in comparison to studies from other regions. It is worth noting that Al-Maddah et al., (2015) used another measure (21-Item BDI); however, it has a comparable sensitivity and specificity to the PHQ-9.

Table 3 Risk factors associated with depression severity among the study participants

Variable	Depression		Adjusted OR (95% CI)	*p* value
	Mild (*n* = 53; 35.6%) *N* (%)	Moderate/severe (*n* = 60; 40.2%) *N* (%)		
Age				
≤ 26 years (*n* = 55, 48.7%)	28 (50.9)	27 (49.1)	1	
> 26 years (*n* = 58, 51.3%)	25 (43.1)	33 (56.9)	1.67 (.70, 3.95)	.45
Gender				
Female (*n* = 62, 54.9%)	24 (38.7)	38 (61.3)	2.12 (.93, 4.81)	.07
Male (*n* = 51, 45.1%)	29 (56.9)	22 (43.1)	1	
Marital status				
Single (*n* = 68, 60.2%)	26 (38.2)	42 (61.8)	2.0 (.88, 4.52)	.10
Married (*n* = 45, 39.8%)	27 (60.0)	18 (40.0)	1	
Children				
No (*n* = 90, 79.6%)	42 (46.7)	48 (53.3)	1	
Yes (*n* = 23, 20.4%)	11 (47.8)	12 (52.2)	1.96 (.50, 7.69)	.34
Have medical problem				
No (*n* = 92, 81.4%)	45 (48.9)	47 (51.1)	1	
Yes (*n* = 21, 18.6%)	8 (38.1)	13 (61.9)	1.74 (.55, 5.49)	.34
Specialty				
Nonsurgery (*n* = 55, 48.7%)	33 (60.0)	22 (40.0)	1	
Surgical (*n* = 47, 41.6%)	17 (36.2)	30 (63.8)	2.60 (1.13, 5.98)	.03
Emergency (*n* = 11, 9.7%)	3 (27.3)	8 (72.7)	4.90 (1.08, 22.20)	.04
Level of residency				
R1 (*n* = 34, 30.1%)	13 (38.2)	21 (61.8)	1	
R2 (*n* = 30, 26.5%)	15 (50.0)	15 (50.0)	.54 (.18, 1.63)	.27
R3 (*n* = 23, 20.4%)	14 (60.9)	9 (39.1)	.23 (.05, .97)	.046
R4 (*n* = 26, 23.0%)	11 (42.3)	15 (57.7)	.29 (.06, .97)	.13
Have on-calls				
No (*n* = 25, 22.1%)	13 (52.0)	12 (48.0)	1	
Yes (*n* = 88, 77.9%)	40 (45.5)	48 (54.5)	1.44 (.40, 5.22)	.53
Number of on-calls/week				
≤ 5 (*n* = 80, 70.8%)	36 (45.0)	44 (55.0)	1	
> 5 (*n* = 33, 29.2%)	17 (51.5)	16 (48.5)	.73 (.27, 1.94)	.52

The current study is in concordance with previous literature (Al-Maddah et al., 2015) that identified an increased risk of depression with increased residency years. Mata et al., in their systematic review, reported a median absolute increase of 15.8% in depressive symptoms with the onset of residency training. Factors contributing to such a trend consider the increased study and work responsibilities, duty hours, program culture, and work environment (Mata et al., 2015).

In terms of specialty, the current study showed an increased risk of depression among emergency medicine residents followed by residents in surgical specialties. Al-Maddah et al. (Al-Maddah et al., 2015) did not report a statistically significant association between depression and specialty in Eastern Saudi Arabia. A high prevalence was observed among general surgery, urology, internal medicine, and neurology residents (Al-Maddah et al., 2015). Mata et al. suggested that the underlying causes of depressive symptoms are common among those in residencies, irrespective of specialty (Mata et al., 2015); thus, differences in the prevalence of depression according to specialty could be explained by variations in the workload and environment.

An increase in working hours and on-call duties was significantly associated with an increase in the prevalence of depression among residents in previous studies (Al-Maddah et al., 2015; Wali, Qutah, Abushanab, Basamh, Abushanab, & Krayem, 2013; Balch, Shanafelt, Dyrbye, Sloan, Russell, Bechamps, & Freischlag, 2010).

Although not a statistically significant difference, female residents showed an increased risk of depression compared to their male counterparts, a finding supported by previous studies, which might be explained by

additional household duties and family care (Al-Maddah et al., 2015; Fahrenkopf et al., 2008). Balancing career development, motherhood, and family responsibilities is a continued challenge facing female physicians worldwide. Half of women doctors in Norway (Gjerberg, 2003) and UK (Lambert, Smith, & Goldacre, 2017) reported increased influence of family responsibilities and children care on their choice of medical specialty. Childbirth and family duties were the principle reasons for a significant drop of labor force participation among female physicians in Japan (Nomura, Yamazaki, Gruppen, Horie, Takeuchi, & Illing, 2015). In Egypt, majority of female physicians decided to have small size family (Farahat, 2009). Playing multiple rules at home and work is a source of tension and stress among both male and female physicians; however, the burden in conservative societies is much higher among women than men where household responsibilities and child-rearing are considered main duties of women (Farahat, 2009). Socio-cultural differences related to distribution of couple responsibilities and their impact on medical career development and opportunities in different societies should be furtherly investigated.

Moreover, 15% of the residents reported having medical problems, and it was observed that these were associated with an increased risk of depression.

The current study's findings might be affected by the relatively small sample size (e.g., emergency residents group) which may lead to an overestimate of the depression prevalence and severity. Also, the study reflects the experience of a single residency training center in Saudi Arabia that limits generalizability of the findings. Other limitations are related to data self-reporting and the lack of gold-standard diagnostic clinical interviews.

The current study revealed a high prevalence of depression among the studied physician residents. This study alerts residency programs, medical schools, and medical licensing organizations of a hidden problem that needs focus for early identification and intervention with better mental health care for physicians in training. Residents may not look for help mostly because of the stigma associated with seeking mental health care and an increased expectation of high performance and minimal complaints while under training (Mata et al., 2015; Myers, 2003).

Mental health services, adequate mentoring, managing workloads, and social off-duty activities could mitigate the problem and reduce the long-term associated burden not only on future physicians' quality of life and well-being but also on patients' quality of care. Further multicenter study would provide an accurate estimate of depression prevalence, personal and professional consequences, and a better understanding of the factors contributing to this problem among physician residents.

Compliance with Ethical Standards

Conflict of interest Abdullah Alshardi and Fayssal Farahat declare that they have no conflict of interest.

Human and Animal Rights All procedures followed in this study were in accordance with the ethical standards of the IRB office of King Abdullah International Medical Research Center (KAIMRC), Saudi Arabia. The IRB of KAIMRC approved the study. No laboratory animals were included in the study.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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