

Work stress: psychological impact and correlates in a sample of Egyptian medical residents

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Background

Heavy training rotations load looms over medical residents because of spending long working hours in a stressful environment, the demands of which might exceed their adapting capacity and could affect their psychological and endocrinal functions. The main objective of this research was to study the depressive symptoms, anxiety symptoms, and sequence of salivary cortisol rise as work stress parameters among medical residents in the Ain Shams University, Faculty of Medicine, and identify their correlates.

Participants and methods

This cross-sectional, descriptive study included 47 residents (age range of 24–29 years) of both sexes and different specialties of Ain Shams University's Faculty of Medicine and who had finished at least 6 months of their residency. Residents with current general medical, allergic, or neurological diseases, substance abuse, and those who scored more than 300 on the social readjustment scale were excluded from the study. All students were assessed using Social Readjustment Rating Scale, the Hospital Consultants' Job Stress and Satisfaction Questionnaire, the Hamilton Anxiety Scale, and the Beck Depression Inventory. Furthermore, salivary cortisol was tested for the students.

Results

Among the studied sample, 38 (87.2%) perceived work as stressful, 24 (51.1%) had mild to moderate depressive symptoms, whereas 26 (55.3%) mild anxiety symptoms, 15 (31.9%) mild to moderate anxiety symptoms, and 22 (46.8%) had an abnormal sequence of cortisol rise. Abnormal sequence of cortisol rise was significantly correlated with residency rank ($P=0.01$), whereas overall work stress was significantly correlated with job clinical nature ($P=0.03$), depressive symptoms ($P=0.04$), and anxiety symptoms ($P=0.02$).

Conclusion

Medical residents showed high level of work stress-related anxiety and depressive symptoms and high level of abnormal salivary cortisol sequence rise, which was correlated to their residency rank.

Keywords:

anxiety, depression, residents, salivary cortisol, work stress

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Introduction

Professional and personal stress is a significant and frequently overlooked component of a medical resident's life [1]. The environment of practicing medicine puts medical residents under significant amount of stress. Studies on emergency medicine residents have identified stressors including stressful patient care responsibilities, patient mortality, peer competition, long hours, night shifts, sleep deprivation, resident safety, violence, and process failures [2] in addition to conflicts between clinical, educational, family, and social responsibilities. These stressors often influence negatively the residents' academic performance, physical health, and psychological

well-being, making them more susceptible to psychiatric disorders [3–5].

Various studies have evaluated the mental health of doctors and indicated that the prevalence of stress-related depressive symptoms among physicians ranged from 10 to 15% [6,7]. Depression and anxiety were associated with decreased levels of productivity and absenteeism [8].

Although stress could be a part of practicing any profession, reduced performance of resident doctors due to vocational stress could cause an increase in medical errors and thus affect the safety and quality of care provided to patients, which in turn adversely affects

patients' health outcomes [9]. Salivary cortisol has been considered as a novel biomarker for psychosocial stress in different researches [10–12]. Further studies suggested that temporal changes, as well as diurnal similarities, in the salivary cortisol patterns can reflect work-related stress and recovery. In particular, early morning cortisol levels may manifest individual reactivity to work stressors as well as sleep deprivation [13].

Because of the limited amount of Egyptian research on prevalence rates of work stress-related psychiatric problems, especially among medical professionals and students, the authors of this study aimed to investigate the magnitude and impact of the work-related stress problems on medical residents' psychological health by measuring the prevalence rates of depression, anxiety, and sequence of salivary cortisol rise in relation to work-related stress.

Participants and methods

Participants

A total of 47 residents working in the Faculty of Medicine, Ain Shams University, voluntarily participated in this cross-sectional, descriptive study conducted over a period of 1 year (2013–2014). Residents of both sexes were included. In addition, all participants who had finished at least 6 months of their residency, with ages ranging between 24 and 29 years, were included. In contrast, residents with current general medical, allergic, or neurological diseases; those on substance abuse; and those who scored more than 300 on the social readjustment scale were excluded from the study. Laboratory investigations were carried out at the Biochemistry Department, the Faculty of Medicine, Ain Shams University. The study was conducted after obtaining approval of the Research and Ethical Committees of the Institute of Psychiatry and of the Faculty of Medicine, Ain Shams University. Anonymity of the participants was completely preserved, and all participants, after they were explained the nature of the present research, signed an informed consent, emphasizing their voluntary participation and the right of withdrawal at any time without having to give reasons.

Tools applied in the study

All participants were subjected to the following:

- (1) A sociodemographic designed questionnaire to collect detailed history for exclusion of any medical or neurological condition that might interfere with the process of the study.
- (2) Social Readjustment Rating Scale [14] to measure for everyday stress so as to exclude those residents with severe social stress.
- (3) Hospital Consultants' Job Stress and Satisfaction Questionnaire [15]: It consists of two sections: (a) factors contributing to job stress and overall job stress, and (b) factors contributing to job satisfaction and overall job satisfaction.
- (4) Hamilton Anxiety Scale [16] to measure the severity of anxiety symptoms.

- (5) Beck Depression Inventory (BDI) [17] to assess the severity of depressive symptoms among medical residents.
- (6) Three salivary samples were collected from each resident within 24 h to measure the salivary cortisol level at 9:00 a.m., 4:00 p.m., and 10:00 p.m. (tested by using ELISA).

Statistical analysis

Collected data were tabulated and analyzed using the computerized 19th version of statistical package for the social sciences (SPSS; SPSS Inc., Chicago, Illinois, USA).

Results

Sample characteristics

Out of 47 medical residents, 27 (57.4%) were women and 20 (42.6%) were men; most of them were living in urban areas [46 (97.9%)] and were single [34 (72.3%)]. Six (16%) residents reported a family history of psychiatric illness, and only one (2.1%) had a past psychiatric history. In terms of their residency ranking, 13 (27.7%) residents were ranked as junior residents, 19 (40.4%) as subsenior, and 15 (31.9%) as senior residents. Regarding work departments, 26 (55.3%) worked in the Internal Medicine Department, and regarding job clinical nature, 32 (38%) residents had patient-centered work (i.e. dealing with inpatients), and 15 (32%) had nonpatient-centered work (i.e. working in academic departments or dealing with outpatients only).

As regards social stress according to Social Readjustment Rating Scale score, 23 (48.9%) residents reported low stress and 24 (51.1%) reported moderate stress (Table 1).

Impact of work stress

Impact of work stress was measured in the present study by the following parameters: perceived overall work stress and satisfaction as measured by Hospital Consultants' Job Stress and Satisfaction Questionnaire, depressive symptoms, anxiety symptoms, and sequence of salivary cortisol rise.

Among the 47 residents, 38 (87.2%) perceived their work to be stressful. Results pointed out that 26 (55.3%) reported having 'high level' of job stress, and 17 (36.2%) residents were highly satisfied by their job.

According to the BDI scores, 24 (51.1%) residents were having mild to moderate depressive symptoms. While all residents (100%) were suffering from anxiety symptoms on Hamilton Anxiety Scale, 26 (55.3%) had mild anxiety symptoms and only four (8.5%) had severe symptoms. Considering salivary cortisol data, 25 (53.2%) residents had a normal sequence of rise and 22 (46.8%) had an abnormal sequence (having the mid-day and evening values higher than the morning value) (Table 2).

Correlates of work stress parameters

Correlation of work stress parameters with the different sociodemographic and residency program variables were

Table 1 Sociodemographic and residency program parameters

Variables	N (%)
Sex	
Male	20 (42.6)
Female	27 (57.4)
Residence	
Urban	46 (98)
Rural	1 (2)
Marital status	
Married	13 (27.7)
Single	34 (72.3)
Past psychiatric history	
Positive	1 (2)
Negative	46 (98)
Past medical history	
Positive	1 (2)
Negative	46 (98)
Family psychiatric history	
Positive	5 (11)
Negative	42 (89)
Family medical history	
Positive	20 (42.6)
Negative	27 (57.4)
Residency rank	
Junior	13 (27.6)
Subsenior	19 (40.4)
Senior	15 (32)
Work department	
Internal medicine	26 (55.3)
Surgery	6 (12.8)
Clinical pathology	5 (10.6)
Academic	7 (14.9)
Radiodiagnosis	1 (2.1)
Audiology	2 (4.3)
Job clinical nature	
Patient centered	32 (68)
Nonpatient centered	15 (32)
Social Readjustment Rating Scale	
Low stress	23 (48.9)
Moderate stress	24 (51.1)

analyzed using the χ^2 -test, where results showed that neither the severity of depressive symptoms nor the severity of anxiety symptoms among the participated residents were correlated to any of the sociodemographic or the residency program variables (Table 3).

While there was a highly statistically significant correlation between the salivary cortisol abnormal sequence of rise and residency rank ($P = 0.01$), 10 (45.5%) residents who had an abnormal sequence of cortisol rise were senior residents, eight (36.4%) were junior residents, and only four (18.2%) were subseniors. In contrast, 15 (60%) of those who had a normal sequence of cortisol rise were subsenior residents, whereas senior and junior residents were five (20%) each, and yet other sociodemographic data had no statistically significant relation to the abnormal sequence of cortisol rise (Table 3).

Regarding correlations of perceived overall work satisfaction, the only significant correlation was with the sex of the residents ($P = 0.005$); results showed that most of the residents who found their job as slightly satisfying were women [13 (81.2%)] and only three (18.8%) were men; moreover, two-thirds of those who were highly satisfied with their job were men [11 (64.7%)] and women were six (35.3%) (Table 4).

As regards the perceived overall work stress, there was a statistically significant relation between perceived overall

Table 2 Distribution of work stress parameters among the study participants

Variables	N (%)
Overall work stress	
Normal	6 (12.8)
Mild	7 (14.9)
Moderate	5 (10.6)
Severe	26 (55.3)
Extremely stressful	3 (6.4)
Overall work satisfaction	
Not at all	3 (6.4)
Mild	16 (34.0)
Moderate	8 (17.0)
High	17 (36.2)
Extremely satisfying	3 (6.4)
Depressive symptoms	
Normal	19 (40.4)
Borderline clinical depression	4 (8.5)
Mild	17 (36.2)
Moderate	7 (14.9)
Anxiety symptoms	
Mild	26 (55.3)
Mild to moderate	15 (31.9)
Moderate to severe	4 (8.5)
Severe	2 (4.3)
Salivary cortisol	
Morning salivary cortisol	
Normal	45 (95.7)
High	2 (4.3)
Mid-day salivary cortisol	
Normal	39 (83.0)
High	8 (17.0)
Evening salivary cortisol	
Normal	29 (61.7)
High	18 (38.3)
Cortisol rise sequence	
Normal	25 (53.2)
Abnormal	22 (46.8)

work stress and job clinical nature ($P = 0.03$): 20 (76.9%) of those who were severely stressed from their work were residents with patient-centered job nature, whereas only six (23.1%) were residents of nonpatient-centered job nature (Table 4); no other sociodemographic data or residency program variables had any statistically significant relation to overall work stress (Table 3).

As regards relation of perceived overall work stress to other work stress parameters, results showed a statistically significant relation between perceived overall work stress and both depressive symptoms ($P = 0.04$) and anxiety symptoms ($P = 0.02$), where 19 (73.1%) patients who perceived their job as severely stressful had depressive symptoms and 16 (61.5%) had anxiety symptoms. There was no statistically significant correlation between perceived overall work stress and abnormal sequence of cortisol rise ($P = 0.4$) (Table 4).

Discussion

Work stress is becoming an important health problem affecting all workers in the healthcare field [18]. Though some amount of stress may be helpful for the management of patients, sustained unbearable stress may affect physical and mental health [19]. Previous studies revealed that work-related stress increases the risk for depression, anxiety, and suicide in doctors [20].

Table 3 Relation between sociodemographic and residency program variables with different work stress parameters

	P-value ^a				
	Overall work satisfaction	Overall work stress	Cortisol rise	Depressive symptoms	Anxiety symptoms
Sex	0.005**	0.4	0.4	0.7	0.5
Marital status	0.7	0.4	0.4	0.4	0.8
Residency rank	0.7	0.5	0.01*	0.2	0.3
Job type	0.2	0.03*	0.06	0.9	0.8
Work Department	0.08	0.4	0.2	0.2	0.3

^aχ²-Test.

*Significant.

**Highly significant.

Table 4 Correlations of perceived overall work stress and satisfaction

	Not At All	Mild	Moderate	Severe	Extremely stressful	P value (χ ²)
<i>Overall work stress [N (%)]</i>						
<i>Depressive symptoms</i>						
No depressive symptoms	4 (66.7)	4 (57.1)	1 (20.0)	7 (26.9)	3 (100.0)	0.04*
Depressive symptoms	2 (33.3)	3 (42.9)	4 (80.0)	19 (73.1)	0 (0.0)	
<i>Anxiety symptoms</i>						
No anxiety symptoms	6 (100.0)	5 (71.4)	2 (40.0)	10 (38.5)	3 (100.0)	0.02*
Anxiety symptoms	0 (0.0)	2 (28.6)	3 (60.0)	16 (61.5)	0 (0.0)	
<i>Cortisol rise sequence</i>						
Normal	4 (66.7)	3 (42.9)	3 (60.0)	12 (46.2)	3 (100.0)	0.4
Abnormal	2 (33.3)	4 (57.1)	2 (40.0)	14 (53.8)	0 (0.0)	
<i>Job clinical nature</i>						
Patient centered	1 (16.7)	4 (57.1)	4 (80.0)	20 (76.9)	3 (100.0)	0.03*
Nonpatient centered	5 (83.3)	3 (42.9)	1 (20.0)	6 (23.1)	0 (0.0)	
<i>Overall work satisfaction [N(%)]</i>						
<i>Sex</i>						
Male	3 (100.0)	3 (18.8)	1 (12.5)	11 (64.7)	2 (66.7)	0.005**
Female	0 (0.0)	13 (81.2)	7 (87.5)	6 (35.3)	1 (33.3)	

*Significant.

**Highly significant.

The main objective of the current research was to study the depressive symptoms, anxiety symptoms, sequence of salivary cortisol rise together with overall work stress as work stress parameters among medical residents in Ain Shams University's Faculty of Medicine, and to identify their correlates.

Results showed that a high percentage of participant residents (87.2%) perceived their work to be stressful, and 55.3% reported having 'high level' of job stress. This is similar to the results of a study by Abdulghani *et al.* [21], who studied the prevalence of stress in junior doctors during their internship training and found that nearly 73% of the interns were stressed. This could be explained by the notion that the majority of residents had too much concern or worry about how well would they perform during the residency training besides their heavy work duties, serious responsibilities, less family and leisure times spent, and the consuming mental energy nature of work. This is supported by a number of studies dealing with work stress among physicians, which revealed that work concern was the most common source of stress followed by financial and family concerns [22,23].

There was a statistically significant relation between perceived overall work stress and job clinical nature. In total, 20 (76.9%) of those who were severely stressed from their work were residents with patient-centered job nature, and only six (23.1%) were residents of nonpatient-centered

job nature; this can be explained by the exposure of residents within the patient-centered group to patients' suffering and pain or even end-stage illness, and thus have to use the available limited resources to provide accepted service that should satisfy the patients and their worried relatives [24].

Several studies point at a higher prevalence of depressive symptoms in medical residents compared with the general population [25]. According to the BDI scores, current study results showed that 51.1% of the participated residents were having mild to moderate depressive symptoms. Similar percentages were detected in a number of studies; 50% of medical residents in Hong Kong had depressive symptoms [26], whereas 40.5% of Brazilian medical interns showed a general prevalence of depression, with 34.5, 4.8, and 1.2% reporting mild, moderate, and severe depressive symptoms, respectively [27]. This goes in line with the studies declaring that the prevalence of anxiety and depression among residents during their training in different countries and institutions ranged from 21 to 56% [28,29]. In their study, Patti *et al.* [30] noticed that depression took place in 15–30% of the physician residents in the emergency department, which is in agreement with the results of a Dutch study that concluded that depressive symptoms were prevalent in 29% of the physicians [31]. These figures are much higher compared with those obtained in some studies in other countries. For example, the prevalence of depressive symptoms among physicians in

the US, Britain (ICU physicians), Canada, Norway, Japan, and Benin were 11.3, 12, 15.5, 11, 8.8, and 14%, respectively [6,32–35]. This can be attributed to the lack of scheduled shifts plans, when some of the residents in each field take around a month or more off for studying and exams, the high flow of patients exceeding the staff team work capacity, and also to the lack of positive reinforcement during training.

Regarding anxiety symptoms among medical residents in the current study, 26 (55.3%) patients had mild anxiety symptoms and 15 (31.9%) had mild to moderate anxiety symptoms. Previous studies investigating the prevalence of anxiety symptoms among physicians showed lower estimates. A Chinese study found that only 25.67% of their study physicians had anxiety symptoms [26]. A study in Kuwait conducted on 247 physicians reported that ‘anxiety, fears, and worrying’ were positively expressed by 25.9% of their participants [23]. A Dutch study revealed that anxiety symptoms were reported by 24% of their study sample [31]. This difference in anxiety symptoms’ prevalence could be explained by the difference in work environment, which could be more stressful in Egypt than in the above-mentioned countries, as physicians’ income in Egypt is much lower than that of physicians in many western countries, and, also, there exists a mismatch between high workload and relative low reward among physicians in Egypt.

Overall work stress was significantly correlated with both depressive symptoms and anxiety symptoms, where 73.1% of the patients who perceived their job as severely stressful had depressive symptoms and 61.5% had anxiety symptoms. Similarly, Chen *et al.* [36] found that anxiety scores increased from minimal to mild during internship and recovered to baseline 2 weeks after the internship ended. Tokarz *et al.* [37] proposed many factors to be responsible for turning medical residents into a high-risk group for emotional conditions, such as student–doctor transition, professional responsibility, social isolation, fatigue, sleep deprivation, overwork, fear of committing mistakes, and other factors connected to the residency educational process.

Regarding the salivary cortisol level, 53.2% of the residents had a normal sequence of rise and 46.8% had an abnormal sequence (having the mid-day and evening values higher than the morning value). Overall, 45.5% of the residents who had an abnormal sequence of cortisol rise were senior residents, 36.4% were junior residents, and only 18.2% were subsenior residents. In contrast, 60% of those who had a normal sequence of cortisol rise were subsenior residents, whereas senior and junior residents were 20% each. This can be explained by the differences in work duties and responsibilities among juniors, sub seniors, and seniors residents. Where juniors facing more duties and new things to learn while seniors having more responsibilities, in addition to passing the Master’s exams ‘first part for the juniors and second part for the seniors’. Similarly, multiple studies found an association between high job strain and an elevated cortisol awakening response, higher morning cortisol, or evening cortisol [38–40], whereas others found inverse associations [41]. In their study, Harvey *et al.* [42]

reported a higher salivary cortisol level and a lower technical performance among residents subjected to high stress-simulated trauma resuscitation, and this could explain the fatigue experienced by residents [43].

Although stressful, medical residency is an enriching experience, providing professional and personal development for young physicians. Therefore, residents need more support and personal guidance to become good physicians and residency programs should offer support to help professionals develop the communication skills they need to become competent professionals [5].

Limitations

This cross-sectional, descriptive study only took a snapshot view of the studied outcomes, and thus any attempt at future prediction on the basis of the findings should be made with caution. The study assessed a small sample of residents working in the Ain Shams University’s Faculty of Medicine only; a larger sample from different universities and hospitals would be more representative and results could be generalized.

Conclusion

Medical residents experience remarkable work stress that has an impact on their psychological health in the form of anxiety and depressive symptoms, which may affect the quality of services provided to patients. Residents with patient-centered job nature perceived their work as more stressful. Furthermore, it was found that residency rank has an influence on salivary cortisol sequence of rise.

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Conflicts of interest

There are no conflicts of interest.

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