Egyptian Journal of Occupational Medicine, 2024; 48 (1) : 1 - 15

WORK RELATED STRESS AMONG MEDICAL RESIDENTS AT TERTIARY CARE HOSPITALS

By

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DOI: *10.21608/ejom.2023.208600.1310*

Submit Date: *2023-05-17* ***Revise Date:*** *2023-06-14* ***Accept Date:*** *2023-06-18*

Authors' contributions: *All authors contributed equally in this work.*

Abstract

Introduction: Stress caused by work is a worldwide problem secondary to work nature and activities that may lead to recurrent absenteeism from work and work disabilities. **Aim of Work:** To assess the psychosocial work related stress and its impact on medical residents working at Menoufia tertiary healthcare hospitals. **Materials and Methods:** It is a cross sectional study conducted at three tertiary healthcare hospitals in Menoufia governorate. The study included 315 medical residents. Participants answered a structured interview questionnaire, Effort-Reward Imbalance (ERI) model was used to evaluate work stress and Middlesex Hospital questionnaire (MHQ) aiming at examining the psychological effects of occupational stress. **Results:** Work related stress was prevalent among 82.9% of the medical residents in the studied hospitals and 65.7% of them had high over commitment. Work stress was significantly associated with lower mean age, smoking, among those working in medical departments, with lower mean for working years, higher mean for working hours/day, taking more night shifts/ week and among those who did not take break during working hours. High over commitment was significantly associated with lower mean age, single females and non-smokers, junior and mid senior residents, working in medical departments, with lower working years, higher working hours/day, dealing with higher number of patients per day and with taking more night shifts/ week. Work stress was significantly associated with higher phobic anxiety and depression (p=0.027 and p= 0.004; respectively). **Conclusion and Recommendations:** Work related stress and overcommitment were prevalent among medical residents working at Menoufia tertiary care hospitals and associated with anxiety and depression. This association could be improved via implementing appropriate interventions to reduce stress, including training and practice modifications .at hospitals to help the health care workers to adapt to their work stress factors

Key words: Work related stress, Overcommitment, Medical residents, Anxiety and Depression

Introduction

Occupational stress is a unique form of stress which differs from biological, physical, and chemical factors in being linked to specific occupational conditions and can also harm health status in non-specific ways. The health effects of stress included physical, psychological, and personal behavior changes (Li et al., 2021).

Medical workers complain of heavy workload, frequent interpersonal interaction, imbalance between work hours and rest hours, and are particularly exposed to occupational diseases, putting them at risk of occupational stress. Medical healthcare personnel also must balance employment commitments, personal safety, and other psychological issues in addition to severe physical labour (Zhu et al., 2022).

Many of primary healthcare physicians suffered from high work burden, restricted autonomy and administrative work loads. They also experienced restricted resources, unpredictable work hours and high efforts expectations due to their position as physicians (Nilsen et al., 2021).

There were few studies conducted in Menoufia governorate to evaluate stress among health residents (e.g. Al-sayed et al., 2016 and Hassan et al., 2020), so we intended to carry out this work in an attempt to cover the research gap in this area.

Aim of Work

To assess the psychosocial work related stress and its impact on medical residents working at Menoufia tertiary healthcare hospitals.

Materials and Methods

Study design: It is a cross-sectional study.

Place and duration of study: This study was carried out at three tertiary care hospitals at Menoufia governorate, Egypt (Menoufia University Hospitals, National Liver Institute and Shebin El Kom Teaching hospital) from the beginning of March 2021 till the end of April 2023.

Study sample: All the medical residents who worked at the three studied hospitals (640 residents) were invited to participate in the study; 270 were excluded from the start as they were residents for less than one year. The remaining 370 were asked to join this study but 55 declined. The study's sample size finally was 315 individuals,

with a response rate of around 85.1% (315/370). The participants in this study were from all departments of hospitals involving medical and surgical departments (general and special).

Study methods:

The author interviewed all participants after the end of their work shifts in the departmental offices of the studied hospitals and they answered the following questionnaires:

I. Socio demographic and occupational questionnaires

It contained socio-demographic information (age, gender, smoking, marital state, performance of exercise) and occupational history (job description, name of hospital, work duration and working shift hours).

A formal pilot study was conducted on 10 persons who were excluded from the study population to test the possibility of questionnaire application and to modify appropriately. Based on a review of previous researches, this questionnaire was created and implemented.

II. Assessing work stress by Effort-Reward Imbalance (ERI) model:

Siegrist, 2004 created the Effort-Reward Imbalance (ERI) model to assess work stress. This model identifies that high effort or low reward at work leads to work related stress. Furthermore, this model includes a state of coping with work needs known as over-commitment. The ERI model had 23 items which are divided into three categories as follow: 6 items for effort, 11 items for reward and 6 items for overcommitment. Physical loads, time pressure, responsibilities interruptions, working overtime and increasing needs at work all contributed to the effort component. The financial, self-confidence, regular upgrade and work stability aspects comprised the reward component (Li, 2005).

The validated version of the ERI Arabic-translated questionnaire was used. The effort components were graded on a 5-point scale (1: Disagree, 2: Not at all distressed, 3: Moderately distressed, 4: Distressed, and 5: Very distressed), with higher ratings indicating greater effort at work. The 11 reward components were rated in the same way, but the interpretation was inverted, with a lower reward score indicating a higher rate of subjective distress due to poor reward (Almadi, 2013).

The ERI total score was calculated by dividing effort by reward, with a factor of correction for the varying numbers of items in each scale as follow: E/R ratio = (effort score/reward score ×1.834); a score of one or less shows a balance between effort and reward, whereas a score greater than one implies a supposed disproportion between work effort and reward (Siegrist, 2004).

The self-esteem, security items and promotion on the over-commitment scale were measured by six questions graded on a 4-point scale (1: Strongly disagree; 2: Disagree; 3: Agree; 4: Strongly agree) with the total score ranging from 0 to 24. A total score in the upper tertile of the overall score indicated high over-commitment (Van Vegchel, 2005).

III. Middlesex Hospital Questionnaire (MHQ) (Crown, 1966):

It was composed of questions aiming at examining the psychological effects of occupational stress on medical residents. It consists of 6 domains; the response for each item in these domains was graded as 0,1,2. All response options are offered on a three-point scale (range: 0-2), with greater numbers signifying poor health. Each domain contains some items as follow:

1. Anxiety domain: which included 8 questions numbered 1,7,13,19,25,31,37,43.

2. Phobia domain: which included 8 questions numbered 2,8,14,20,26,32,38,44.

3. Obsession domain: which included 8 questions numbered3,9,15,21,27,33,39,45.

4. Somatic domain: which included 8 questions numbered 4,10,16,22,28,34,40,46.

5. Depression domain: which included 8 questions numbered 5,11,17,23,29,35,41,47.

6. Hysteria domain: which included 8 questions numbered 6,12,18,24,30,36,42,48.

A total score can be obtained from the MHQ by summation of all eight components. Higher scores indicate poorer health. Subscale scores can be calculated by summing the items of their components as well. There is no cut point values but calculated by comparing the mean score of different groups.

Consent

All participants had detailed information about the study aims and signed an informed consent form.

Ethical Approval

The study was formally reviewed and permitted by the Committee for Medical Research Ethics at Menoufia Faculty of Medicine as well as the respective involved hospitals prior to initiating this study.

Data Management

Statistical analysis was done by SPSS version 20. Two kinds of statistical methods were used. Descriptive statistics such as percentage (%), mean, t-test was used for comparing two means and standard deviation (SD) and Analytic statistics such as Mann-Whitney U test which was used to compare between two quantitative variables that were not normally distributed and the Chi-squared ($\chi 2$) test which was used to show the association between two or more qualitative variables. P-values less than <0.05 were considered statistically significant.

Results

Table (1): Demographic and work characteristics of the studied participants.

Demographic and work characteristics		**Participants (No=315) No (%)**
Age (years)	Mean ± SD	26.75±1.56
	Range	25-30
Sex:	Male	93 (29.50)
	Female	222 (70.50)
Marital status:	Married	195 (61.90)
	Single	120 (38.10)
Smoking:	Smokers	45 (14.30) 270 (85.70)
	Non-smokers	
Exercise performance:	Yes	135 (42.90)
	NO	180 (57.10)
Department:	Medical	225 (71.40)
	Surgical	90 (28.60)
Resident category:		
Juniors and mid seniors		168 (53.30)
Seniors		147 (46.70)

Working years	Mean ± SD Range	2.72±1.55 1.00-5.00
Working days/ week:	<5 days ≥5 days	81 (25.70) 234 (74.30)
Working hours/ day	Mean ± SD Range	7.07±1.51 4-12
Number of night shifts/ week	Mean ± SD Range	1.98±1.16 1-5
Day off after night shift:	Yes NO	135 (42.90) 180 (57.10)

Table 1 showed demographic and work characteristics of the studied participants. Most of them were married, non-smokers, females , aged from 25-30 years. More than half of the participant (57.1%) did not perform exercise. Most of them belonged to medical departments (71.4%) as juniors and mid seniors (53%). Approximately74.3% of the participants worked more than 5 days/week.

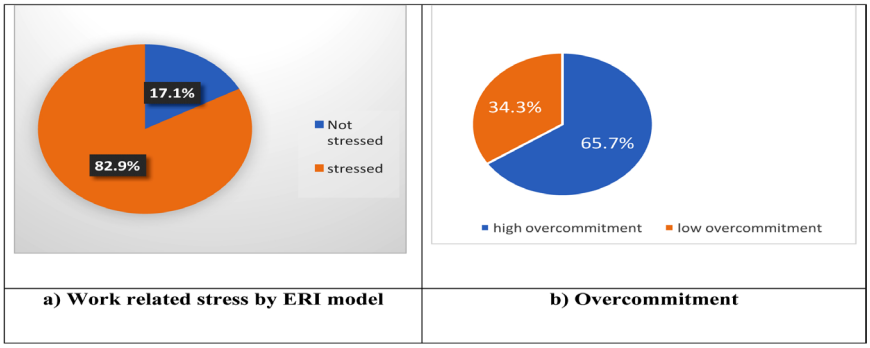

Figure 1: Prevalence of work related stress and overcommitment among the studied participants.

The prevalence of work-related stress among the medical residents was 82.9% as indicated by Effort/Reward ratio > 1 and 65.7% of them had high overcommitment as shown in Fig 1(a and b; respectively).

Table (2): Effort-Reward Imbalance (ERI) in relation to demographic and work characteristics of the studied participants (No =315)

Demographic and work characteristics	Effort/Reward ratio		Test of significance	p-value
	≤ 1 (No =54) No (%)	1 < (No=261) (%) No		
Age (years) Mean ± SD	27.50±1.48	26.60±1.53	t=3.97	***0.001>**
Smoking: Smokers Non-smokers	3 (6.70) 51 (18.90)	(93.30) 42 (81.10) 219	$\chi 2$= 4.06	***0.044**
Type of department: Medical Surgical	(13.30) 30 (26.70) 24	195 (86.70) 66 (73.30)	$\chi 2$= 8.05	***0.005**
Resident category Junior, Mid senior Senior	(10.70) 18 (24.50) 36	150 (89.30) 111 (75.50)	$\chi 2$= 10.47	***0.001**
Working years Mean ± SD	3.53±1.43	2.56±1.52	U=4.10	***0.001>**
Working hours/ day Mean ± SD	6.67±1.21	7.15±1.55	t=2.15	***0.032**
Number of night shifts per week Mean ± SD	1.56±1.13	2.07±1.15	U=2.89	***0.004**
Taking Break during working hours Yes NO	(26.80) 33 (10.90) 21	(73.20) 90 (89.10) 171	$\chi 2$= 13.33	***0.001>**

χ^2 : Chi square test U: Mann-whitney test . t: Student t test

*: Statistically significant.

Among the studied participants, work stress (indicated by E/R imbalance > 1) was significantly associated with lower mean age, smokers and it was significantly prevalent among medical residents at Menoufia University hospital followed by National Liver Institute, among those working in medical departments, with lower mean values of working years, higher mean values of working hours/day, taking more night shifts/ week and among those who did not take break during working hours as shown in Table (2).

It was statistically insignificant as regards gender, marital status, exercise performance, working days per week, number of patients per day and day off after the night shift (results are not tabulated).

Table 3: Overcommitment in relation to demographic and work characteristics of the studied participants (No =315)

Demographic and work characteristics	Overcommitment		Test of significance	p-value
	Low (No =108) No (%)	#High (No =207) No (%)		
Age Mean ± SD	27.44±1.70	26.39±1.34	t=6.01	**<0.001***
Sex Male Female	45 (48.40) 63 (28.40)	48 (51.60) 159 (71.60)	χ^2=11.64	**0.001***
Marital status Married Single	 78 (40.00) 30 (25.00)	 117 (60.00) 90 (75.00)	χ^2=7.42	**0.006***
Smoking: Smokers Non-smokers	24 (53.30) 84 (31.10)	21 (46.70) 186 (68.90)	χ^2=8.45	**0.004***
Site of work: Menoufia university Teaching hospital National liver institute	 24 (22.90) 75 (46.30) 9 (18.80)	 81 (77.10) 87 (53.70) 39 (81.30)	χ^2= 21.60	**<0.001***
Type of department: Medical Surgical	 69 (30.70) 39 (43.30)	 156 (69.30) 51 (56.70)	χ^2= 4.58	**0.032***
Resident category Juniors, Mid seniors Seniors	 45 (26.8) 63 (42.9)	 123 (73.2) 84 (57.1)	χ^2= 8.99	**0.003***
Working years Mean ± SD	 3.39±1.69	 2.38±1.34	U=5.07	**<0.001***
Working hours/day; Mean ± SD	6.72±1.27	7.25±1.60	t=2.96	**0.016***
Number of patients/ days: Mean ± SD	 24.19±20.30	 32.52±32.70	U=3.21	**0.001***
Number of night shifts/ week Mean ± SD	 1.44±1.04	 2.26±1.13	U=6.64	**<0.001***
Day off after night shift Yes NO	 51 (37.80) 57 (31.70)	 84 (62.20) 123 (68.30)	χ^2=1.28	0.258

#: High over commitment = the upper tertile of the total score

χ^2: chi square test U: Mann-whitney test t: student t test *: Statistically significant.

High over commitment was significantly associated with lower mean age, single, females and non-smoker residents, who are working at National Liver Institute followed by Menoufia University hospital, juniors and mid seniors residents, among those working in medical departments, with lower mean values of working years, higher mean values of working hours/day, dealing with higher number of patients per day and with taking more night shifts/ week as shown in Table (3).

It was statistically insignificant as regards exercise performance, working days per week, day off after the night shift and taking break during working hours (results are not tabulated).

Table (4): Effort-Reward Imbalance (ERI) in relation to Middlesex Hospital Questionnaire (MHQ) subtest scores among the studied participants (No=315)

MHQ subtest	Effort/Reward ratio		Test of significance	p-value
	≤ 1 (No =54) Mean ± SD	> 1 (No =261) Mean ± SD		
Anxiety (A)	8.89±3.65	9.67±3.42	U=1.54	0.123
Phobic anxiety (P)	6.50±2.74	7.44±2.88	U=2.21	**0.027***
Obsessionality (0)	10.44±2.88	10.01±2.88	t=1.01	0.315
Somatic concomitants of anxiety (S)	9.11±3.36	8.33±3.53	U=1.40	0.161
Depression (D)	6.61±2.45	7.92±3.29	U=2.87	**0.004***
Hysteria (H)	8.94±3.25	9.54±2.99	U=1.23	0.218

U: Mann-whitney test t:student t test *: Statistically significant.

Among the studied participants, work stress (indicated by E/R imbalance > 1) was significantly associated with higher phobic anxiety and depression as shown in Table 4.

Discussion

Rates of stress and burnout among medical students, residents, and practicing physicians were high. Heavy workloads and work-life imbalance have been cited as reasons. Depression, anxiety, hostility, and medical errors were common consequences (Raimo et al., 2018).

About 83% of the studied medical residents had stress and 65.7% of them had high overcommitment (Figure 1). This was in agreement to Jiang et al. (2019) who found that the incidence of stress and its determinants among medical residents in the China Training Program for Resident Doctor (C-STRD) was high. They detected that C-STRD residents worked under serious stress as their mean values of Perceived Stress Scale (PSS) score was 27.5 ± 4.9, which was greater than the high stress threshold (PSS = 20).

A previous study was done at Mansoura University Hospitals, Egypt on anesthesiologists by Shams and El-Masry (2013) who found that 69.4% of them experienced job stress. In South Africa, 51% of physicians in public general hospitals reported to be stressed; 27% of them were complaining of high stress (Govender et al., 2012). In Saudi Arabia; about 58% of health physicians found to have stress as a result of the study done by Bahnassy et al. (2018) on stress among residents in a tertiary care center, Riyadh, Saudi Arabia. Edmonds et al. (2012) observed in Canada that 50% of healthcare workers in cancer departments in four main hospital Oncology centers in Ontario City experienced high levels of work stress.

The differences in the stress levels among previous researches could be attributed to different features and resources at the environment of work, work experience level, the level of training of physicians and socio-demographic factors. Prior reports recommended variable environmental and personal factors standing behind this elevated work stress levels among medical residents such as workload, imbalance between work and social life, declined job satisfaction, inadequate salary, lack of sleep, and other factors (O'Dowd et al., 2018).

The mean age of the residents participating in this study was 27.21 years with the youngest being 25 years old and the eldest being 30 years old (Table 1). A significant association was present between lower age and stress (Table 2). Junior physicians

experienced more work stress secondary to overloaded and crowded hospitals with more complicated cases but they gained medical knowledge and skills continuously with practice. A significant association between residency years and stress was found also by Naidu et al. (2019) who found that residency year affects stress where young residents in the first 1-2 years have more stress than their counter partners in the 5th residency year as they have less expertise and less self-confidence.

The current result was in agreement with the findings of Kerlin et al. (2020) who found that the higher stress score levels was detected among juniors and mid seniors and this explained by many factors; they are juniors in the medical field, confronted with complicated and severe cases, being responsible for reports provided to senior supervisors and take orders from them. In addition, they are more susceptible to superiors' negative views, and more exposed to deal with dying patients and accidents.

Work stress indicated by E/R imbalance was significantly associated with smoking (Table 2). This could be explained by Monroe et al. (2015) who stated that smoking is considered by medical staff smokers as a mean of overcoming the occupational stress, which becomes another excuse to stop smoking. Some studies propose that under certain circumstances cigarette nicotine can act as an anxiolytic and an antidepressant on the CNS, while refused by other studies which found that chronic nicotine use can lead to adaptations to nicotine resulting in increased anxiety and depression (Hall et al., 2015)

A statistically significant association was found between high level of stress and being a single resident among the studied group (Table 2). Staying with family posed positive psychological impact that may help to relieve work stress**.** This finding could be explained that stable emotional and marital life can reduce the impact of exposed stress at work (Ahmad, 2008). On the other hand, other previous reports did not find any significant difference in stress scores between married and single studied medical physicians (Bahnassy et al., 2018).

There was a statistically significant association between long working hours and work-related stress (Table 2). The effort-reward imbalance was prevalent (78.39%) among emergency physicians

in China. The results revealed that male physicians with a low degree, an intermediate job title, longer years of service, more frequent night shifts, and who suffered violence at the workplace were at a higher risk of effort-reward imbalance. In contrast, physicians with higher monthly income and perceived adequate staff were associated with a lower risk of effort-reward imbalance (Tian et al., 2022).

Long lasting working hours per week and working on weekends were linked with an increased burnout and effort/reward imbalance (ERI) scores. In a study done by Beschoner et al. (2020) on changes in working conditions and mental health among Intensive Care physicians; from 2006 to 2016 (n=2,085 physicians), reductions in working hours per week and decrease working on weekends were associated with significant improvements in occupational stress (as indicated by ERI) and by trend in mental health indices (burnout) after matching for other factors as differences in working conditions.

High over commitment was significantly associated with lower mean age, single, females and non-smoker junior and mid senior residents. Also, high over commitment was associated with working in medical departments, with long working hours/day and dealing with high number of patients per day (Table 3). Overcommitment relies upon personal characteristics as attitude, behavior and emotions which reflects work effort loads and a strong feeling of need and drive to achieve. In several researches, overcommitment has been connected to long term stress, insomnia, poor health condition and fatigue at work (Kunz, 2019, Sergio et al, 2021 and Schneider et al, 2023).

Work stress (indicated by E/R imbalance > 1) was significantly associated with higher phobic anxiety and depression (Table 4). The current result is supported by the findings of Harvey et al. (2021) who revealed that medical residents are more susceptible to mental disorders such as anxiety, depression, and occupational burnout, most likely due to their exposure to high levels of work stress.

Study limitations: The nature of the study design being cross sectional study limited its ability to prove the chronobiological effects of work stressors on medical residents. Furthermore, the small sample size could limit the generalization of these

results. Despite these limitations, this study reflects the association between work stress and its psychological impact on the medical residents. Therefore, these results should be confirmed by large-scale studies.

Conclusion and Recommendations

Work related stress and overcommitment were prevalent among medical residents working at Menoufia tertiary care hospitals and associated with anxiety and depression. This association could be improved via implementation of appropriate interventions to reduce stress, including training and practice modifications at hospitals to help the health care workers to adapt to their work stress factors.

Funding

None.

Conflict of interest

No conflict of interest.

Acknowledgements

The authors acknowledged the participants included in this study.

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