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Prevalence and determinants of stress among medical residents in ministry of National Guard, Saudi Arabia

Moteab Sayer Alotaybi[1]✉, **Hani Saad Al-Mugti**[2], **Majed Naif Alosaimi**[3], **Abdulmalik Mohammed Alsabban**[4], **Abdullah F Al Otaibi**[5], **Osama Abdulmajeed A Bugis**[6]

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Author Affiliation:
[1]Preventive Medicine, National Guard health affairs, Jeddah, Saudi Arabia
[2]Community and Preventive Medicine Department, Ministry of National Guard Health Affairs, Jeddah City, Saudi Arabia
[3]Consultant preventive medicine, National Guard health affairs, Riyadh, Saudi Arabia
[4]Internal Medicine, Ministry of National Guard, Jeddah, Saudi Arabia
[5]Public Health Administration, Ministry of Health, Makkah, Saudi Arabia
[6]Public Health Administration, Ministry of Health, Jeddah, Saudi Arabia

✉**Corresponding author**
Preventive Medicine, National Guard health affairs, Jeddah, Saudi Arabia;
Email: Moteab.alotaybi@gmail.com

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ABSTRACT

Background: The residency programs are essential part of post-graduation program in Saudi Arabia. Medical trainee is subjected to stressful environment including high workload, intensive emotional events, high expectations, and increased risk of workplace violence. This study aims to conduct assessment of the prevalence and determinants among medical residents in the ministry of National Guard, Saudi Arabia. *Subject and Methods*: The participants were selected randomly from the list of the residents in each specialty using systematic random sampling. The study started February 2020 and terminated at January 2021. The study was designed as a cross-sectional design. Self-administered questionnaires are used to collect data about study variables. The questionnaire consists of 41 questions. *Results*: A sample of 250 participants was analyzed. When using PS scale, 70.8% of participants were regarded as 'normal' while 29.2% of them recorded abnormal stress. Those who slept less than 6 hours had had abnormal PSS than normal ones. Second, average number of patients being seen either in ED or outpatient clinic were higher in normal category rather than abnormal category. A multivariate regression analysis showed increased number of consultations per day, doctor-doctor relationships and nature of medical job as stressors were statistically significant and considered as causes of stress in our study. *Conclusion:* Despite equal rate of perceived stress records in our study to previous literatures, no stress management tools or plans were designed. This should be available with collaboration of psychiatric department in any national health trust.

Keywords: Prevalence, Determinants, Stress, Residency

1. INTRODUCTION

Background

The medical professions require long extensive training because of the diverse and sensitive duties that should be done by the medical practitioners (Tekian,

2014). The residency period is an essential part of doctoral specialization program in Saudi Arabia. Medical trainee are subjected to stressful working environment including high workload, intensive emotional events, high expectations, and increased risk of work place violence (Visser et al., 2003). Many studies revealed that a higher level of stress is observed among medical trainees than that in general population (Dyrbye et al., 2006; Compton et al., 2008; Turkistan et al. 2020). A study among Dutch residents found 12% reported having suicidal ideation at least 1 time during their residency. At the personal level, residents are usually have insufficient personal time, sleep deprivation, and uncontrolled agenda (Veasey et al., 2002). This work-related stress affects the occupational health of the residents and can lead to burnout which commonly associated with serious consequences such as medical errors, low work performance, and low work satisfaction (Chou et al., 2014). The prevalence of burnout among health workers peaks to the level of epidemic with more than 50% of medical practitioners exhibited signs and symptoms of work burnout (Shanafelt et al., 2009; Shanafelt et al., 2012; Shanafelt et al., 2014). Moreover, work stress can reduce the residents' quality of life (West et al., 2011), cause conflicts with family (Ríos et al., 2006), and predispose for psychiatric conditions (Waldman et al., 2009).

In the literature, a great variety of interventions were suggested to control the stress among medical trainees. These interventions targeted medical trainees using health promotion programs such as self-development training, yoga and meditation, self-hypnosis, stress-management groups, and modification of training programs (Shiralkar et al., 2013). A systematic review, included 6 RCTs and 13 cohort studies, assessed the effectiveness of several interventions such as work hours restriction, self-care workshops, stress management training, and mediation (Busireddy et al., 2017). They found the restriction of work hour recommended by Accreditation Council for Graduate Medical Education (ACGME) is the best intervention to reduce stress and burnout level.

Literature review

The impact of stress on the health of medical practitioners is significantly severe and can influence the safety of the patients. The stress and work load among care givers were found to be high either in the training or in the working stages (IsHak et al., 2009). In the literature, the prevalence of stress in medical trainees ranged from 10 to 96% (Fawzy and Hamed, 2017). This wide variation could be attributed to the different assessment tools and different medical professions or levels for which the stress was assessed.

In Saudi Arabia, only few studies targeted medical residents while most studies focused on the stress level and its determinants among medical students. A comparison between level of stress among female medical and non-medical university students found a higher level of stress in medical students compared to non-medical counterparts (Al-Dabal et al., 2010). The prevalence of stress in medical students in King Saud bin Abdul-Aziz University was 53%. Moreover, the stress level was found significantly related to the poor sleep quality (Almojali et al., 2017). About a half of medical students at King Saud University reported they had stress (Alsalhi et al., 2018).

Later on, in the residency period, a high prevalence of stress is still reported within medical trainees. Among third year residency in SCHS, about 70% of residents said they had stressful conditions. About 23% reported severe stress, while only 27.4% reported mild stress (Abdulghani et al., 2015). In regards to specialty, residents in Emergency Medicine department reported the highest level of stress (81%) followed by the residents in Internal Medicine (74%). The main stressors were found by this study were absence from duties, inadequate activities, and presence of other health problems (Abdulghani et al., 2015). Residents from different medical specialties were included in a national-level study aimed to assess stress-management strategies (Alosaimi et al., 2015a). The most common stress-relief strategy was found to be the religious activities followed by acceptance strategy and active coping (Alosaimi et al., 2015b).

In the residency stage, about 65% of family medicine residents in Saudi Arabia were complaining of high or moderate work stress (Aldubai et al., 2019). The findings showed that stress during training stage were significantly associated with training factors such as exams, large scientific content, work load, and lack of support system. In a study recruited 1035 Saudi residents, about 68% the residents said they felt namely "fairly" or "very" nervous and stressed in the previous month (Alosaimi et al., 2015a). Female gender and Saudi nationality of the residents are significant factors associated with higher scores of the stress. Other stressors included high work load, low satisfaction with specialty program, and sleep disturbances (Alosaimi et al., 2015a).

Rationale

The training stage is essential stage in the medical practitioner academic life which frequently associated with stress, anxiety, burnout and sometimes depression (Bernburg et al., 2016). A proper evaluation of stress and its determinants among medical residents was enhancing the planning and execution of the proposed intervention. In Saudi Arabia, the Saudi Commission for Health Specialties provides an academic and psychological support system called DAEM which ensure the help with maintain of

privacy and confidentiality. They provide interactive guidance to the residents during their training stage. The assessment of the magnitude and determinants of stress among Saudi medical residents can provide guidance to the proper intervention.

Aim of the study

This study aims to conduct assessment of the prevalence and determinants among medical residents in the ministry of National Guard, Saudi Arabia.

Objectives

- To assess the prevalence of stress among medical residents in the ministry of National Guard.
- To identify important sociodemographic characteristics influencing the stress level among medical residents in the ministry of National Guard.
- To identify the work-related stressors among medical residents in the ministry of National Guard.

2. MATERIALS AND METHODS

Study design

This was a cross-sectional study design. The study started February 2020 and terminated at January 2021.

Study population

Resident who is actively enrolled in any of SCFHS accredited programs in the Ministry of National Guard.

Study area

The National Guard King Khalid Hospital, in Jeddah city, is a 531-bed modern facility providing hospital and health care services to Saudi Arabian National Guard soldiers and their dependents. This facility includes Medical, Surgical, Obstetrics, Gynecology, Labor and Delivery, Intensive Care Unit (ICU) for Adult, Pediatric and Neonatal Services, Coronary Care Unit (CCU), Emergency Room, Operating Rooms, VIP Wards, Day Center to include Ambulatory Surgery, and several Primary Health Care clinics spread over the Western Region.

In addition, there is an active Outpatient Department functioning 5 days a week, a busy theatre complex and a 24-hour Accident and Emergency Department. There are also separate VIP clinics and waiting areas for Royal Family members and important personages.

Inclusion criteria

- Resident who is actively enrolled in any of SCFHS accredited programs and completed 6 months in the academic year.
- Residents who provided an informed consent to participate in the study.

Exclusion criteria

- Residents with underlying psychiatric condition.
- Residents who freeze their program.
- R1 residents who didn't complete 6 months since enrollment.

Sample size

The number of participants required to estimate the level of stress is calculated using this equation:

$$n = \frac{\mathrm{P}(1-P)z^2}{d^2} =$$

The expected level of residents' stress is approximately 80% based on the level of stress reported in a previous study (Abdulghani et al., 2015). Thus, at the confidence level of 95% and estimation error of 0.05, the minimal sample size is calculated as following:

$$n = \frac{0.80(1-0.80)1.96^2}{0.05^2} = 246 \text{ participants}$$

Sampling technique

The stratified systematic sampling technique was used in this study. The participants were selected randomly from the list of the residents in each specialty using systematic random sampling. The number of selected residents from each specialty was determined based on the percentage of the residents in this specialty from total number of residents.

Data collection tool

We used a self-administered questionnaire to collect data about study variables. The questionnaire consists of 41 questions about socio-economic characteristics of the participants, past medical and familial history, life-style factors, residency-related factors, recent stressors, job satisfaction, and presence of stress-coping strategies. This questionnaire is previously piloted among Saudi residents by Alosaimi et al., (2015b). The face and content validity of this questionnaire were assessed by experts in psychiatry, ethics, and epidemiology prior to piloting with 20 participants. The stress level was evaluated using perceived stress scale (PSS), which is a 10-question tool for measuring a person's perception of stress over the past month. The responses for each item are collected in Likert scale (never, almost never, sometimes, fairly often, or very often) with stress scores range from 0 for never to 4 for very often. The reverse coding was considered during calculation of stress scores, so questions 4-8 were reversely scored. The PSS was calculated by summing up the score for each question and the score value is indication of stress level. The internal consistency for PSS was found good with 0.74 Cronbach's Alpha (Almadi et al., 2012).

Data collection technique

The data was collected through self-administered questionnaire and the interviewers were around to answer the enquiries of the participants regarding the questionnaire.

Study variables

Dependent variable: Level of residents' stress, Level of residents' job satisfaction, Stress management strategy, Awareness about burnout phenomenon

Independent variables: Age, Gender, Marital status, Nationality, Income, Level of training, Specialty Work-related factors (shifts, calls, working days, number of patients, and severity of cases), Medical history, Previous or family history of stress or psychiatric illness Smoking, Alcohol drinking, sleep deprivation

Data entry and analysis

The data were entered and analyzed by Statistical Package of Social Science SPSS, version 26. The descriptive statistics such as frequencies, percentages were calculated to summarize nominal and ordinal data, while mean, median and standard deviation or the range to describe numerical variables. Chi-squared test was evaluated the association between the predictor variables and the level of stress, while the means of residents' stress scores were compared using T-test. Any P-value < 0.05 was considered as an indication for a statistically significant association or difference.

Pilot study/pre testing

The questionnaire was piloted in 20 residents to identify the difficulties and the time required to finish the questionnaire. Then the questionnaire was revised by two experts, an epidemiologist to revise the methodological quality of the questionnaire and a consultant to revise the scientific component of the questionnaire.

3. RESULTS

Participants' criteria

As shown in Table 1, more than 50% of participants were above age of 30 years old. Male gender constitutes 54.8% of them. Only 6% of participants were of non-Saudi nationality. Internal medicine followed by family medicine were the most prominent specialties in our study (19%, 15%) respectively.

PSS

When using PS scale, 70.8% of participants were regarded as 'normal' while 29.2% of them recorded abnormal stress. The mean, standard deviation and range is tabulated in table 2. Indeed, the distribution of PS scale is bell-shaped according to Figure 1 with seemingly normal distribution (Kolmogorov-Smirnov test=0.09).

Table 1 Participants' criteria		
	N	%
Age group		
<30	144	57.6
>30	106	42.4
Gender		
Female	113	45.2
Male	137	54.8
Nationality		
Saudi	235	94.0
Non-Saudi	15	6.0
Marital status		
Married	114	45.6
Single	126	50.4
Divorced	7	2.8
Separated	3	1.2
Specialty		
Emergency Medicine	11	4.4
Family Medicine	38	15.2
Internal Medicine	49	19.6
Obstetrics-Gynecology	25	10.0
Dermatology	10	4.0
Ophthalmology	7	2.8
Oncology	3	1.2
Pediatrics	22	8.8
Psychiatry	4	1.6
Surgery	20	8.0
ENT	11	4.4
Orthopedic	7	2.8
Radiology	13	5.2
Anesthesiology	8	3.2
Preventive Medicine	10	4.0
Plastic Surgery	4	1.6
Neurology	8	3.2

Table 2 Perceived stress scale in our study.				
	PERCEIVED STRESS SCALE		Score	
	N	%	Range	Mean±SD
Normal	177	70.8	4-38.	21.516+4.632
Abnormal	73	29.2		
Total	250	100.0		

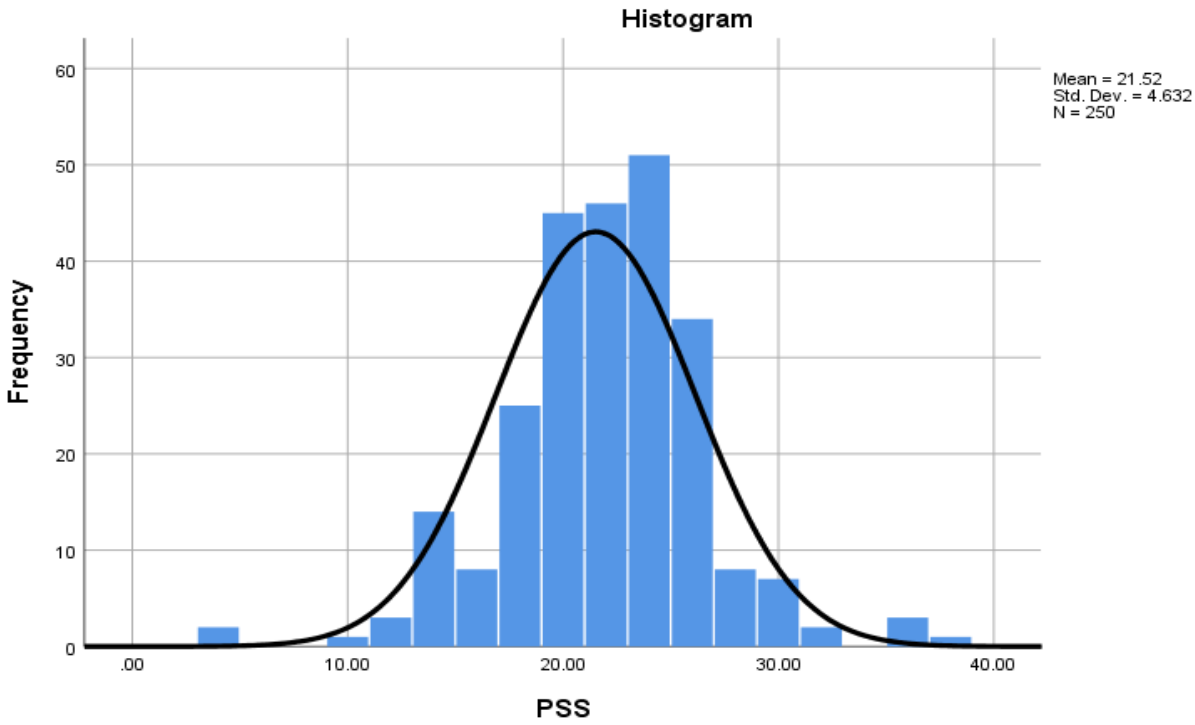

Figure 1 Histogram of PSS in our study.

PSS and demographic data

In table 3, demographic data were tabulated against final response of the scale. No statistically significant difference were found to emphasize any statistical linkage with demographic variables (p>0.05).

Table 3 Demographic variables testing versus PS scale.									
		PSS				Total		Chi-square	
		Normal		Abnormal					
		N	%	N	%	N	%	X^2	P-value
Age group	<30	104	58.8%	40	54.8%	144	57.6%	0.332	0.564
	>30	73	41.2%	33	45.2%	106	42.4%		
Gender	Female	84	47.5%	29	39.7%	113	45.2%	1.247	0.264
	Male	93	52.5%	44	60.3%	137	54.8%		
Nationality	Saudi	163	92.1%	72	98.6%	235	94.0%	3.919	0.048
	Non-Saudi	14	7.9%	1	1.4%	15	6.0%		
Marital status	Married	76	42.9%	38	52.1%	114	45.6%	1.850	0.604
	Single	94	53.1%	32	43.8%	126	50.4%		
	Divorced	5	2.8%	2	2.7%	7	2.8%		
	Separated	2	1.1%	1	1.4%	3	1.2%		

Specialty	Emergency Medicine	7	4.0%	4	5.5%	11	4.4%	2.511	0.113
	Family Medicine	28	15.8%	10	13.7%	38	15.2%		
	Internal Medicine	28	15.8%	21	28.8%	49	19.6%		
	Obstetrics-Gynecology	18	10.2%	7	9.6%	25	10.0%		
	Dermatology	6	3.4%	4	5.5%	10	4.0%		
	Ophthalmology	7	4.0%	0	0.0%	7	2.8%		
	Oncology	2	1.1%	1	1.4%	3	1.2%		
	Pediatrics	18	10.2%	4	5.5%	22	8.8%		
	Psychiatry	2	1.1%	2	2.7%	4	1.6%		
	Surgery	14	7.9%	6	8.2%	20	8.0%		
	ENT	7	4.0%	4	5.5%	11	4.4%		
	Orthopedic	4	2.3%	3	4.1%	7	2.8%		
	Radiology	13	7.3%	0	0.0%	13	5.2%		
	Anesthesiology	6	3.4%	2	2.7%	8	3.2%		
	Preventive Medicine	9	5.1%	1	1.4%	10	4.0%		
	Plastic Surgery	2	1.1%	2	2.7%	4	1.6%		
	Neurology	6	3.4%	2	2.7%	8	3.2%		
Residency year	R1	31	17.5%	13	17.8%	44	17.6%	5.212	0.266
	R2	59	33.3%	22	30.1%	81	32.4%		
	R3	55	31.1%	18	24.7%	73	29.2%		
	R4	29	16.4%	15	20.5%	44	17.6%		
	R5	3	1.7%	5	6.8%	8	3.2%		

PS scale and work related variables

Table 4 summarizes the work related variables and PSS categories (normal and abnormal). Many variables were statistically insignificant while only three questions were highly different. First, sleeping hours; those who slept less than 6 hours had had abnormal PSS than normal ones. Second, average number of patients being seen either in ED or outpatient clinic were higher in normal category rather than abnormal category. The later described good handling of ED and outpatient management despite increased patients' flow. Third, abnormal PSS category how manage life threatening problems are more prone to stress (p=0.0001).

Table 4 Work related variables versus PS scale.

		PSS				Total		Chi-square	
		Normal		Abnormal					
		N	%	N	%	N	%	X^2	P-value
Type of training program	Joint-multi-hospital	51	28.8%	26	35.6%	77	30.8%	1.122	0.289
	One hospital program	126	71.2%	47	64.4%	173	69.2%		
Number of on calls per month	No	19	10.7%	4	5.5%	23	9.2%	2.189	0.534
	1-3.	39	22.0%	20	27.4%	59	23.6%		
	4-6.	105	59.3%	43	58.9%	148	59.2%		
	>7	14	7.9%	6	8.2%	20	8.0%		
Type of on calls:	Home on call	25	14.1%	10	13.7%	35	14.0%	0.008	0.930
	Hospital on call	152	85.9%	63	86.3%	215	86.0%		
Post call leave:	8:00 a.m	43	24.3%	17	23.3%	60	24.0%	4.330	0.228
	10:00 a.m	51	28.8%	25	34.2%	76	30.4%		
	1:00 p.m	38	21.5%	8	11.0%	46	18.4%		
	None	45	25.4%	23	31.5%	68	27.2%		
Average number of	<4 hrs	4	2.3%	1	1.4%	5	2.0%	25.837	0.000*

sleeping hours per day in the last month:	4-6 hrs	37	20.9%	39	53.4%	76	30.4%		
	7-8 hrs	90	50.8%	22	30.1%	112	44.8%		
	>8 hrs	46	26.0%	11	15.1%	57	22.8%		
Do you feel refreshed after your sleep:	No	76	42.9%	39	53.4%	115	46.0%	2.288	0.130
	Yes	101	57.1%	34	46.6%	135	54.0%		
Duration of break times you usually take during working days:(in minutes)	No	5	2.8%	5	6.8%	10	4.0%	3.709	0.295
	1-30	17	9.6%	10	13.7%	27	10.8%		
	30-60	80	45.2%	27	37.0%	107	42.8%		
	>60	75	42.4%	31	42.5%	106	42.4%		
Number of working weekends/month:	No	29	16.4%	4	5.5%	33	13.2%	6.065	0.194
	One	36	20.3%	19	26.0%	55	22.0%		
	Two	78	44.1%	34	46.6%	112	44.8%		
	Three	30	16.9%	15	20.5%	45	18.0%		
	Four	4	2.3%	1	1.4%	5	2.0%		
Average number of patients you are seeing in the ward:	<10	65	36.7%	39	53.4%	104	41.6%	6.654	0.036*
	10-20	66	37.3%	23	31.5%	89	35.6%		
	>20	46	26.0%	11	15.1%	57	22.8%		
Average number of Out-Patient Clinics you are doing per week:	<10	60	33.9%	38	52.1%	98	39.2%	10.263	0.016*
	10-30	45	25.4%	13	17.8%	58	23.2%		
	30-50	57	32.2%	13	17.8%	70	28.0%		
	>50	15	8.5%	9	12.3%	24	9.6%		
Average number of patients you are seeing per one clinic:	<10	53	29.9%	33	45.2%	86	34.4%	5.347	0.069
	10-20	70	39.5%	23	31.5%	93	37.2%		
	>20	54	30.5%	17	23.3%	71	28.4%		
In general, do you manage life threatening cases?	No	81	45.8%	16	21.9%	97	38.8%	12.376	0.0001*
	Yes	96	54.2%	57	78.1%	153	61.2%		

PSS questionnaire

Twenty-three questions were answered by participants and tabulated against PSS category as shown in Table 5. All these questions exhibited statistically significant difference except questions 8, 13, 15-22. Significant differences between categories reflect exact differences in satisfaction levels.

Table 5 Hypothesis testing of PS scale questionnaire's answers

		PSS				Total		Chi-square	
		Normal		Abnormal					
		N	%	N	%	N	%	X^2	P-value
1. Are you Satisfied with your relationships with colleagues:	Strongly dissatisfied	1	0.6%	1	1.4%	2	0.8%	15.680	0.003*
	Dissatisfied	1	0.6%	2	2.7%	3	1.2%		
	Not sure	18	10.2%	20	27.4%	38	15.2%		
	Satisfied	116	65.5%	34	46.6%	150	60.0%		
	Strongly satisfied	41	23.2%	16	21.9%	57	22.8%		
2. Overall are you satisfied with your training program?	Strongly dissatisfied	0	0.0%	2	2.7%	2	0.8%	18.703	0.001*
	Dissatisfied	8	4.5%	9	12.3%	17	6.8%		
	Not sure	33	18.6%	23	31.5%	56	22.4%		

	Satisfied	106	59.9%	34	46.6%	140	56.0%		
	Strongly satisfied	30	16.9%	5	6.8%	35	14.0%		
3. What is the most satisfying part of your training program (you can choose more than one answer)?	Trainers	115	65.0%	36	49.3%	151	60.4%	5.297	0.021*
	Exams	38	21.5%	14	19.2%	52	20.8%	0.165	0.685
	departments	48	27.1%	25	34.2%	73	29.2%	1.270	0.260
	the program's directors/board	39	22.0%	18	24.7%	57	22.8%	0.202	0.653
	None	13	7.3%	8	11.0%	21	8.4%	0.877	0.349
	Others	5	2.8%	6	8.2%	11	4.4%	3.226	0.072
4. What is the most dissatisfying part of your training program (you can choose more than one answer)?	Trainers	14	7.9%	9	12.3%	23	9.2%	1.208	0.272
	Exams	143	80.8%	49	67.1%	192	76.8%	5.419	0.020*
	departments	32	18.1%	17	23.3%	49	19.6%	0.890	0.346
	the program's directors/board	30	16.9%	18	24.7%	48	19.2%	1.980	0.159
	None	9	5.1%	3	4.1%	12	4.8%	0.111	0.739
	Others	3	1.7%	8	11.0%	11	4.4%	9.347	0.002*
5. Do you consider your job environment as stressful?	Strongly dissatisfied	4	2.3%	0	0.0%	4	1.6%	30.839	0.000*
	Dissatisfied	13	7.3%	2	2.7%	15	6.0%		
	Not sure	64	36.2%	19	26.0%	83	33.2%		
	Satisfied	80	45.2%	24	32.9%	104	41.6%		
	Strongly satisfied	16	9.0%	28	38.4%	44	17.6%		
6. Have you ever thought of changing your specialty?	Yes, very often	2	1.1%	15	20.5%	17	6.8%	36.379	0.000*
	Sometimes	66	37.3%	33	45.2%	99	39.6%		
	Rarely	41	23.2%	13	17.8%	54	21.6%		
	Never	68	38.4%	12	16.4%	80	32.0%		
7. During the residency program, have you ever thought of quitting all medicine profession?	Yes, very often	3	1.7%	14	19.2%	17	6.8%	24.633	0.000*
	Sometimes	54	30.5%	22	30.1%	76	30.4%		
	Rarely	42	23.7%	17	23.3%	59	23.6%		
	Never	78	44.1%	20	27.4%	98	39.2%		

Table 5 continued…

		PSS				Total		Chi-square	
		Normal		Abnormal					
		N	%	N	%	N	%	X^2	P-value
8. Do you have a current or past history of major medical illness?	Yes	15	8.5%	11	15.1%	26	10.4%	2.269	0.132
	No	162	91.5%	62	84.9%	224	89.6%		
9. Do you have a current or past history of psychiatric illness?	Yes	5	2.8%	15	20.5%	20	8.0%	19.706	0.000*
	No	172	97.2%	58	79.5%	230	92.0%		
10. Have you ever received any psychiatric help?	Yes	15	8.5%	14	19.2%	29	11.6%	5.774	0.016*
	No	162	91.5%	59	80.8%	221	88.4%		
11. Do you have a family history of psychiatric illness?	Yes	20	11.3%	16	21.9%	36	14.4%	4.728	0.030*
	No	157	88.7%	57	78.1%	214	85.6%		
12. Have you ever had wishes to die in the last one month?	Nearly every day	1	0.6%	0	0.0%	1	0.4%	9.799	0.002*
	Several times	9	5.1%	8	11.0%	17	6.8%		
	Rarely	15	8.5%	18	24.7%	33	13.2%		

	Not At All	152	85.9%	47	64.4%	199	79.6%		
13. Have you ever had thoughts of harming yourself in any way in the last one month?	Several times	5	2.8%	2	2.7%	7	2.8%	7.405	0.025
	Rarely	19	10.7%	18	24.7%	37	14.8%		
	Not At All	153	86.4%	53	72.6%	206	82.4%		
14. Have you been facing any stressor in the last one month?	Yes	103	58.2%	55	75.3%	158	63.2%	6.793	0.009*
	No	74	41.8%	18	24.7%	92	36.8%		
15. Are you a smoker	Yes	47	26.6%	25	34.2%	72	28.8%	1.463	0.226
	No	130	73.4%	48	65.8%	178	71.2%		
16. Have you ever used alcohol or other illicit drugs?	Often	3	1.7%	0	0.0%	3	1.2%	2.171	0.538
	Sometimes	14	7.9%	6	8.2%	20	8.0%		
	Rarely	17	9.6%	8	11.0%	25	10.0%		
	Not At All	143	80.8%	59	80.8%	202	80.8%		
17. Have you ever heard about burnout phenomena among physicians?	Yes	124	70.1%	53	72.6%	177	70.8%	0.162	0.687
	No	53	29.9%	20	27.4%	73	29.2%		
18. Have you ever been educated or trained in stress management & dealing with burnout phenomena among physician?	Yes	25	14.1%	8	11.0%	33	13.2%	0.452	0.501
	No	152	85.9%	65	89.0%	217	86.8%		
19. What type of stress management activity have you received? (Courses)	No	16	64.0%	4	50.0%	20	60.6%	0.498	0.481
	Yes	9	36.0%	4	50.0%	13	39.4%		
20. What type of stress management activity have you received? (Lectures)	No	10	40.0%	3	37.5%	13	39.4%	0.016	0.900
	Yes	15	60.0%	5	62.5%	20	60.6%		
21. What type of stress management activity have you received? (Workshops)	No	16	64.0%	6	75.0%	22	66.7%	0.342	0.559
	Yes	9	36.0%	2	25.0%	11	33.3%		
22. What type of stress management activity have you received? (Self-education)	No	24	96.0%	8	100.0%	32	97.0%	0.565	0.452
	Yes	1	4.0%	0	0.0%	1	3.0%		
23. Which way of stress management help you like to be provided by the training institutions/programs	None	1	0.6%	5	6.8%	6	2.4%	30.832	0.000*
	Resident's wellness centers	35	19.8%	32	43.8%	67	26.8%		
	Courses	52	29.4%	18	24.7%	70	28.0%		
	Lectures	39	22.0%	7	9.6%	46	18.4%		
	Brief workshops	47	26.6%	8	11.0%	55	22.0%		
	Other	3	1.7%	3	4.1%	6	2.4%		

PSS and COVID

Questions about COVID-19 were tabulated against PSS categories (table 6). These categories showed statistically significant difference with P value <0.05 in question 3, 4 and 6.

Regression Analysis

A multivariate regression analysis was done as illustrated by table 7. Increased numbers of consultations per day, doctor-doctor relationships and nature of medical job as stressors were statistically significant and considered as causes of stress in our study.

Table 6 PS scale categories among COVID pandemic era.									
		PSS				Total		Chi-square	
		Normal		Abnormal					
		N	%	N	%	N	%	X^2	P-value
1. Did you participate in Emergency Preparedness and Response forCovid?	Yes	103	58.2%	48	65.8%	151	60.4%	1.249	0.264
	No	74	41.8%	25	34.2%	99	39.6%		
2. Have you been infected with the Covid?	Yes	30	16.9%	19	26.0%	49	19.6%	2.703	0.100
	No	147	83.1%	54	74.0%	201	80.4%		
3. COVID pandemic has negatively affected my mental and emotional wellbeing?	Yes	63	35.6%	40	54.8%	103	41.2%	11.440	0.003*
	No	46	26.0%	20	27.4%	66	26.4%		
	Not sure	68	38.4%	13	17.8%	81	32.4%		
4. COVID pandemic has negatively affected my family life?	Yes	82	46.3%	48	65.8%	130	52.0%	12.973	0.002*
	No	58	32.8%	22	30.1%	80	32.0%		
	Not sure	37	20.9%	3	4.1%	40	16.0%		
5. COVID pandemic has negatively affected my social life?	Yes	87	49.2%	43	58.9%	130	52.0%	4.001	0.135
	No	49	27.7%	21	28.8%	70	28.0%		
	Not sure	41	23.2%	9	12.3%	50	20.0%		
6. I feel anxious about going home and possibly infecting my family members after being in contact with patients and colleagues at work?	Yes	53	29.9%	36	49.3%	89	35.6%	13.089	0.001*
	No	47	26.6%	22	30.1%	69	27.6%		
	Not sure	77	43.5%	15	20.5%	92	36.8%		

Table 7 multivariate regression analysis							
	B	S.E.	Wald	P-value	Odd	95% C.I. for Odd	
						Lower	Upper
Average number of patients you are seeing	-0.060	0.028	4.752	0.029*	0.942	0.892	0.994
Overall are you Satisfied with your colleagues?	-0.466	0.223	4.389	0.036*	0.627	0.405	0.970
Considering job as a stressor	0.531	0.220	5.800	0.016*	1.701	1.104	2.620

4. DISCUSSION

This study was the first study in National Guard hospital that examines the stress among medical residents of different specialties. The study covered almost all specialties. The PSS seemingly to be slightly higher than that in other regions of the world. The mean PSS was 21.516, where as in Argentina it was found to be 21.7 in cardiology residents (Waldman et al., 2009) and 19 in anesthesia residents in Turkey (Abut et al., 2012) and 16.6 among family medicine in US (Lebensohn et al., 2013). Previous literatures in Saudi Arabia showed comparable values (22.8, 21) in dental and medical students respectively. Basically, the PSS in normal population is much lower than that in medical staff. For example, the mean PSS in US population was 12.75.

In our study there was no statistically significant difference between PSS means among male or female gender and generally in sociodemographic differences (Kamal et al., 2015). Several factors are present in Saudi Arabia may not be seen in other different region like alcohol use. In addition to this, higher workloads and sleep deprivation are regarded as strong risk factors. Prolonged working hours enhance fatigability and sleep deprivation (Zaré et al., 2004). In 2003, USA limited working hours for residents, this limitation positively enhance residents' satisfaction (Fletcher et al., 2005; Goitein et al., 2005). The stressors associated with stress in our study covered three groups of stressors described earlier: institutional, professional, and personal stressors. Although we associated our respondents' stress with dissatisfaction with colleagues (Thorsteinsson et al., 2014) and frequent thoughts of quitting the medical profession (Hämmig, 2018), we are uncertain of whether this dissatisfaction or these thoughts caused the stress or vice versa. Nevertheless, another study has shown that prolonged working hours may be responsible for both stress and decreased job satisfaction among residents. Additionally, we noted an association between stress and harmful ideation. Experiencing stress without conflict resolution may lead to burnout, which may contribute to increasing the risk of suicide. Unfortunately, most of the residents were unaware of such burnout and had never received stress management, which indicates a need for stress management programs during residency.

The current study contributed to knowledge on stress by adding data to the void of information on stress among residents in Saudi Arabia, surveying a relatively large number of residents across several specialties and locations, using a well-validated tool to examine stress, and using a national database for recruitment. The study limitations were in its inability to discover bias, low response rate and using electronic tools rather than hand to hand technique.

5. CONCLUSION

Despite equal rate of perceived stress records in our study to previous literatures, no stress management tools or plans were designed. This should be available with collaboration of psychiatric department in any national health trust.

Ethical considerations

The author described the aim and objectives of the study for the residents and asks them to provide a written consent. No names required to assure confidentiality of data and all information were kept confidential only for this study purposes. The study protocol should be approved by the ethical committee. The study has an institutional review board approval with study number RJ20/072/J.

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Conflict of interest/ Competing interests

The authors declare that there is no conflict of interest regarding the publication of this article.

Data and materials availability

All data associated with this study are present in the paper.

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