

## Occupational Stress among Orthodontists in Saudi Arabia

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## ABSTRACT

**Aim:** The aim of this study was to identify potential occupational stressors among orthodontists practicing in Saudi Arabia, and to evaluate their relationship to personal and professional characteristics. **Materials and Methods:** Using a validated occupational stress assessment (OSA) questionnaire, demographic information and data pertaining to potential occupational stressors and professional characteristics of the participants were collected. The OSA questionnaire was adopted and modified based on Cooper *et al.* classification of potential stressors. To assure anonymity of the protocol, the respondents were given the OSA questionnaire at their clinical settings or scientific meetings and requested to return the filled copy of the questionnaire without any personal disclosures. The severity of stressors was assessed using a five-point Likert scale, and individual scores were summed to obtain the overall severity score. The collected data were coded, tabulated, and analyzed using statistical software. **Results:** Samples of 253 orthodontists were evaluated with a response rate of 82.6% (209) and a higher proportion of male participants (75.1%). The mean severity score for stress was higher among orthodontists of age less than 30 years when compared with those more than 50 years of age ( $F = 3.486$ ;  $P = 0.017$ ). Similarly, the mean severity score was higher among orthodontists who had completed their residency program in Saudi Arabia, Arab countries, and Asian countries ( $F = 5.425$ ;  $P < 0.0001$ ). Further categorization of the stressors based on patient-, time-, staff-, work-, referral-, and income-related factors were carried out. Although patient-related factors (mean = 3.38) were considered the most stressful, referral- and income-related factors (mean = 2.39) were considered the least stressful. **Conclusion:** Pronounced variation was evident in assessing the potential stressors among orthodontists. Nevertheless, time management and proper patient education can address the most concerning stressors among orthodontists in Saudi Arabia.

**KEYWORDS:** Occupational stress, orthodontists, patient satisfaction, Saudi Arabia, time management

## INTRODUCTION

Stress is commonly recognized as a “consequence of the failure of an individual to respond adequately to mental, emotional, or physical demands.”<sup>[1]</sup> Occupational health hazard, which affects the various specialties of dentistry, is often manifested as musculoskeletal disorders.<sup>[2]</sup> In a recent study, around 84% of the medical professionals found their work environment stressful.<sup>[3]</sup> Further, when analyzing the

stress level among medical students, even during the training period 38%–62% have reported to work in a stressful environment when compared to the general.<sup>[4]</sup> Especially, during training, the curriculum structure,

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clinical proficiencies, and patient-relations protocols dictate multiple demanding domains, for dental students to cope up with.<sup>[5]</sup> Specialist dentists are, therefore, highly likely to lead a stressful and strenuous life, increasing their need for therapeutic intervention.<sup>[6]</sup> The multifactorial nature of stress assessment relates to several factors such as heterogeneity of patient population, conducive working environment, job satisfaction, and patient satisfaction.<sup>[6]</sup> Previous research has reported that symptoms of stress in practitioners often manifest according to the individual's mental or physical ill health, job dissatisfaction, severity of stress, and its determinants.<sup>[6]</sup>

Evidence-based investigations on the sources of occupational stress have supported that the clinical environmental factors make dental practice more stressful in comparison to other medical specialties.<sup>[7]</sup> Moreover, predominant stress-induced health hazards among dentists were associated with patient- and time-related factors.<sup>[8]</sup> On the basis of a 40-item stress assessment tool, Newton *et al.*<sup>[9]</sup> and Cooper *et al.*<sup>[10]</sup> reported that the multivariate demands of the profession and patient expectations were the main causes of stress and anxiety among dentists in Britain. It is indeed alarming that dental occupational stress could contribute to potentially deleterious effects among practitioners, including hypertension, coronary artery disease, and suicidal tendencies.<sup>[7,11]</sup>

One of the earliest studies comparing stress-induced heart ailments among orthodontists, oral surgeons, and general dentist was reported by Russek. According to him, general dentists reported stress-induced heart complaints three times more than practitioners from other specialties.<sup>[12]</sup> In addition, the prevalence of coronary heart diseases, as an indirect determinant of occupational stress, was higher among orthodontists in comparison to other dental specialists.<sup>[12]</sup> However, in a similar study comparing stress levels, no significant difference was observed in the perceived stress between six dental specialties, including pediatric dentists and orthodontists who reported the highest degree of occupational stress.<sup>[8]</sup> It is unfortunate that several dentists and dental specialists choose to forego their professional career as a result of the occupational stress involved, in spite of the time, effort, and financial expenditure.<sup>[13]</sup>

Orthodontists, when surveyed within a small sample of specialists in a hospital environment, have revealed significant levels of stress, but lesser burnout than oral surgeons.<sup>[14]</sup> Earlier research in orthodontic cohorts has shown that time-related stressors have often recorded higher severity scores among the participating

orthodontists.<sup>[15]</sup> Nevertheless, these studies either analyzed only the stress levels or the sources of stress as individual entities.<sup>[15,16]</sup> Concerns arise about such an approach due to lack of coherence between the various factors contributing to occupational stress and the personal attributes of the practicing orthodontist. To the best of our knowledge, studies, which investigated the occupational stress in orthodontic specialists in Saudi Arabia, are not available. This study was conceived to reiterate the role of time, patient, and practice management in reducing occupational stress and to fulfill paucity of similar data among Saudi orthodontists. Accordingly, the aim of this study was to identify potential occupational stressors and most stressful aspects of orthodontic practice in Saudi Arabia, and to evaluate their relationship to personal and professional characteristics.

## MATERIALS AND METHODS

### STUDY DESIGN

The study was designed as a questionnaire-based cross-sectional study conducted among the registered members of the Saudi Orthodontic Society. Other practicing dentists of other specialties and the orthodontists not indulging in active clinical practice were excluded from the study.

### SAMPLING FRAME AND SAMPLE SIZE

The sampling frame included all the registered members of the Saudi orthodontic society. Assuming a statistical power of 90%, with 5% confidence interval and at 95% confidence level, the sample size was estimated to be 198 (Epi-Info StatCalc, CDC, Atlanta, Georgia). After 25% overestimation, a sample of 253 orthodontists, from different parts of Saudi Arabia, was randomly identified from the sampling frame and was approached for the self-administered survey.

### SURVEY INSTRUMENT

Several questionnaires were used in previous studies; however, in our study, we used modified version of Occupational Stress Questionnaire, based on the classification system of Roth *et al.*<sup>[15]</sup> A total of 49 stressors were identified from previously reported validated instrument except for referral-related stressors, which was a new category. The questionnaire was designed according to the ethnic and demographic exigencies of the study population and adopted to the orthodontic practice setting prevalent in Saudi Arabia. The questionnaire additionally contained 24 items to collect demographic and occupational data, pertaining to gender, age, nationality, academic level, training, experience, clinical practice setting, and work hours from the respondents. The final

survey instrument (<https://www.dropbox.com/s/g02fasoal4hyvhc/SURVEY.doc?dl=0>) used in the study included unsegregated questions related to orthodontic occupational stress, overall job satisfaction, and the personal and practice characteristics of participants. On the basis of a modification of a previously reported classification of occupational stressors, the questions were categorized based on stressors related to income, patient, time, referral, staff, and work.<sup>[10]</sup> The severity of occurrence of each stressor was quantified using a five-point Likert scale, with assessment endpoints of strongly disagree (scored 1) and strongly agree (scored 5). The final survey instrument was tested within a pilot sample of 10 orthodontists for ease of administration, validity, and reliability.

#### SURVEY DISTRIBUTION

The study was carried out as a web-based survey on [www.surveymonkey.com](http://www.surveymonkey.com). Anonymity was ensured as the e-mail request to participate was sent through the Saudi Orthodontic Society Database, to all the registered members. The web-based survey was password protected, and only the author had access to it. The research period spanning from March 2016 to December 2016, was used for the computer-based survey. Duplicates were prevented by including the respondent's Saudi Orthodontic Society registration number before the respondent could start the survey. Any double entry was thus avoided. Further, the respondents were requested to return the filled copy of the questionnaire without any personal disclosures.

#### ASSESSMENT OF POTENTIAL STRESSORS

The most powerful stressors of orthodontic practice were determined by calculating the "mean severity score." Those stressors with the mean severity score equal to or more than 3.75 were regarded as contributing to occupational stress. The mean category scores were compared to ascertain the significant differences among the various categories.

#### FACTORS INFLUENCING OCCUPATIONAL STRESS

The resultant effect of personal and occupational characteristics on the overall occupational stress score was estimated. Characteristics represented with nominal variables were evaluated with independent sample *t* tests. Comparisons of the categorical variables eliciting their impact on occupational stress were carried out with one-way analysis of variance and Tukey *post hoc* test.

#### STATISTICAL ANALYSIS

The data collected from the questionnaire were coded and tabulated for statistical analysis using Microsoft Excel spreadsheet software (Microsoft Office 2013,

Microsoft, Redmond, Washington). Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software (version 21.0, IBM, Armonk, New York). Descriptive statistics (frequencies, percentages, mean, and standard deviation) were used to describe the categorical and quantitative variables. Student *t* test for two independent samples was used to compare the mean values of severity scores of stress in relation to the study variables, which had two categories. One-way analysis of variance followed by *post hoc* multiple comparison tests (Tukey test) were used to compare the mean values of severity scores of stress in relation to the study variable, which had more than two categories. Pearson correlation was used to quantify the relationship between the severity scores of stress and quantitative study variables. A *P* value of <0.05 was used to report statistical significance.

#### RESULTS

A total of 209 of the practicing orthodontists responded to the survey (82.6% response rate). Among them, 105 participants (49.3%) were in the age-group of 31–40 years and a major proportion (75.1%, *n* = 160) were males. Although Saudi nationals accounted for 66.2% (*n* = 141) of respondents, majority of the orthodontists either had a Master's degree (32.5%, *n* = 68) or were certified by the Saudi Board of Orthodontics (24.4%, *n* = 51). Approximately 27.2% (*n* = 58) of the respondents had 5 years or greater clinical training, with a majority of them acquiring the same through residency programs in Saudi Arabia (45.1%, *n* = 96). The self-reporting bias was avoided by designing close-ended questions, and the responses were recorded in a five-point Likert scale. The number of years of experience as an orthodontist was less than 3 years in 34.3% (*n* = 73) of the respondents and more than 15 years in 11.9% (*n* = 25).

Although majority of the study participants reported practicing in a private clinic (32.9%, *n* = 70), around 17.8% (*n* = 38) were reportedly practicing orthodontics in more than two places. Although the mean number of days at work in a week was 4.55 days, the mean number of hours at work in a week was 29.8 h. The mean number of patients/dental chairs dealt with simultaneously, as reported by the respondents, was 1.78. The descriptive statistical results are presented in detail in Table 1.

The individual scores assigned by the respondents (based on Likert scale) for each of the 49 potential stressors were tabulated to arrive at the mean score for each item. The scoring was reversed, before tabulation and analysis, for 10 items [Table 1], which were found to be de-stressors. All the stressors with a mean score

greater than three were ranked in order as shown in Table 2, and the stressors with a mean score greater than 3.75 were identified as those contributing to occupational stress [Table 3].

The questionnaire items #25 “Motivation of patients with poor hygiene strains me a lot” and #27 “Lack of patient compliance with treatment instructions is painful,” were considered the greatest stressors, with a mean score of 3.99. On the contrary, questionnaire items #9 “I have adequate time for personal/family life,” #34 “I face staff-related problems, which disturb me,” #35 “Interpersonal problems with colleagues stress me,” and #40 “I feel stressed due to fear of sharp injuries” were the smallest stressors, with a mean score of 3.02 [Tables 1 and 4]. Categorizing the stressors based on the six factors (time, patient, staff, work, referral, and income), it was found that patient-related stressors had the highest mean score (3.38). Interestingly, income- and referral-related stressors had the lowest mean score of 2.39 [Table 4].

Comparison of the overall mean severity scores for stressors in relation to the sociodemographic characteristics of orthodontists showed statistically significant differences in relation to their age-groups and places of residency training. The overall mean severity score for stress was higher among orthodontists who were 50 years or younger when compared to those older than 50 years ( $F = 3.486$ ;  $P = 0.017$ ). Similarly, the overall mean severity score for stress was higher among orthodontists who underwent training in Saudi Arabia, Arab countries, and Asian countries when compared to those who were trained in Europe or United States ( $F = 5.425$ ;  $P < 0.0001$ ). The data did not provide any statistically significant differences in overall mean stress severity scores in relation to other variables relating to gender, nationality, academic level, number of years in the residency training program, length of experience, and place of practice [Table 5]. Moreover, no statistically significant correlations were observed between the overall stress severity scores and the number of days in a week at work, number of hours in a week at work, and the number of dental chairs/patients dealt with simultaneously in the clinic [Table 6].

## DISCUSSION

Among medical professions, dentistry has always been projected as the most strenuous with respect to student training and clinical practice.<sup>[17-21]</sup> In the current scenario, the magnitude of physical and mental health challenges faced by dentists is constantly increasing. This could be attributed to occupational stressors

**Table 1: Descriptive statistics of the sociodemographic, educational, professional, and work-related characteristics of the study subjects**

Characteristics	N (%)
Age-groups (in years)	
<30	37 (17.4)
31–40	105 (49.3)
41–50	61 (28.6)
More than 50	10 (4.7)
Gender	
Male	160 (75.1)
Female	53 (24.9)
Nationality	
Saudi	141 (66.2)
Non-Saudi	72 (33.8)
Academic level ( $n = 209$ )	
BDS	25 (12)
MSc	68 (32.5)
PhD	30 (14.4)
Board	51 (24.4)
More than two degrees	35 (16.7)
No. of years in residency training program	
1 and less	12 (5.6)
2	19 (8.9)
3	79 (37.1)
4	45 (21.1)
5 and above	58 (27.2)
Place of residency program	
Saudi Arabia	96 (45.1)
Arab countries	32 (15)
Asian countries	14 (6.6)
Europe	37 (17.4)
America	34 (16)
Length of experience as orthodontist (in years)	
Less than 3	73 (34.3)
3–8	74 (34.7)
9–15	41 (19.2)
>15	25 (11.9)
Place of practice	
Private	70 (32.9)
MOH	31 (14.6)
National guard hospital	10 (4.7)
Security forces hospital	6 (2.8)
Armed forces hospital	22 (10.3)
University clinics	36 (16.9)
More than two places	38 (17.8)
No. of days in a week at work? (mean $\pm$ SD)	4.55 $\pm$ 0.78
No. of hours in a week at work in the clinic? (mean $\pm$ SD)	29.8 $\pm$ 10.11
No. of dental chairs/patients dealt simultaneously in clinic? (mean $\pm$ SD)	1.78 $\pm$ 1.40

SD = standard deviation, MOH = Ministry of Health

within the clinical environment of dental specialties such as orthodontics, oral surgery, and pediatric dentistry.<sup>[14]</sup> Although not as stressful as the surgical specialties, occupational stress within the orthodontic

**Table 2: Rank order of potential stressors evaluated in the study based on the mean severity score (for stressors with score >3.0)**

Rank	Name of stressor item	Mean	SD
1	Motivation of patients with poor hygiene strains me a lot.	3.99	0.90
2	Lack of patient compliance with treatment instructions is painful.	3.99	0.87
3	Patients who are late than the scheduled time, stress me.	3.95	0.99
4	Treating a case with an unfavorable prognosis is disturbing.	3.94	0.90
5	I am tense when patients come with broken appliances.	3.94	0.93
6	Performing clinical tasks on a difficult or uncooperative patient is frustrating to me.	3.86	0.89
7	Motivation of patients with poor elastic and/or headgear compliance stresses me.	3.84	0.94
8	A backache or pain in the back and other musculoskeletal problems caused by prolonged working bothers me a lot.	3.79	0.95
9	I am upset when patients are late or missing adjustment appointments.	3.78	0.98
10	Maintaining high levels of concentration for long periods of time without breaks make me tense.	3.76	1.00
11	Managing “burnt-out” patients makes me tense.	3.73	0.91
12	I am distressed due to the pressure from patients and/or parents to remove appliances before treatment is completed to my satisfaction.	3.71	1.05
13	I am burnt-out by long work hours and constant work pressure.	3.70	1.06
14	I become tense over equipment breakdown and defective materials.	3.64	1.04
15	Patients’ leaving of their treatment halfway and getting them transferring to other clinic is stressful.	3.63	1.09
16	Significant paperwork and administrative duties assigned to me at my workplace affects my professional capabilities and stresses me.	3.59	1.10
17	Threat of unfavorable prognosis significantly affects the way of my practice.	3.51	1.01
18	Patients not understanding why appointments are not available.	3.50	1.22
19	Emergency patient’s treatment is upsetting.	3.46	0.98
20	Lack of clear communication with other dental specialties stresses me.	3.42	1.17
21	The reaction/dissatisfaction of patients due to the prolonged orthodontic treatment stresses me at large.	3.40	0.94
22	Health hazards: physical, chemical, and biological are significant sources of worry.	3.38	1.13
23	I am worried about contracting infection at work place.	3.37	1.06
24	Fear of relapse in retention patients causes stress.	3.34	1.14
25	I am burnt-out to see the long waiting lists.	3.30	1.23
26	My work schedule is not flexible.	3.25	1.22
27	Retention phase of orthodontic treatment often stresses me after treating the patients.	3.21	1.14
28	I have adequate time for relaxation.	3.20	1.26
29	Meeting patients’ aesthetic or functional expectations is stressful mission.	3.20	1.01
30	Working as orthodontist is not a stressful job.	3.17	1.19
31	Significant numbers of my patients have unrealistic expectations regarding the outcome of orthodontic treatment.	3.12	0.99
32	Interpersonal problems with colleagues often stress me a lot.	3.08	1.30
33	I have adequate time for my personal and family life.	3.02	1.32
34	I face staff-related problems (absenteeism, personal friction etc.), which disturb me.	3.02	1.19
35	I feel stressed due to fear of sharp injuries caused by a small operating field, frequent patient movement, and the variety of sharp instruments (e.g., cutter) or materials (e.g., orthodontic wire or pins).	3.02	1.16

SD = standard deviation

clinical setting has been related to job satisfaction and better treatment outcomes.<sup>[14]</sup> These perceived causes of occupational stresses if recognized at an early stage can be minimized and would help in preventing orthodontic working burnouts.<sup>[22]</sup>

Orthodontic specialty in Saudi Arabia requires more rigorous training averaging 8–10 years.

After the orthodontists begin to practice, they work with patients with serious emotional distress due to aesthetic concerns. As occupational stress is greatly determined by the individual and environmental interactions,<sup>[11]</sup> the sociocultural influences of the local population have a greater effect in the treatment protocols. Thus the orthodontist is not only entrusted with esthetic improvement of the profile but also a comprehensive

**Table 3: Most concerning stressors among orthodontists evaluated in the study (mean severity score > 3.75)**

Rank	Name of stressor item	Mean	SD
1	Motivation of patients with poor hygiene strains me a lot.	3.99	0.90
2	Lack of patient compliance with treatment instructions is painful.	3.99	0.87
3	Patients who are late than the scheduled time, stress me.	3.95	0.99
4	Treating a case with an unfavorable prognosis is disturbing.	3.94	0.90
5	I am tense when patients come with broken appliances.	3.94	0.93
6	Performing clinical tasks on a difficult or uncooperative patient is frustrating to me.	3.86	0.89
7	Motivation of patients with poor elastic and/or headgear compliance stresses me.	3.84	0.94
8	A backache or pain in the back and other musculoskeletal problems caused by prolonged working bothers me a lot.	3.79	0.95
9	I am upset when patients are late or miss adjustment appointments.	3.78	0.98
10	Maintaining high levels of concentration for long periods of time without breaks makes me tense.	3.76	1.00

SD = standard deviation

**Table 4: Mean severity scores of the six categories of stressors**

Stressor category	No. of items in category	Mean severity score	SD
Time related	5	3.32	0.66
Patient related	17	3.38	0.46
Staff related	3	2.99	0.92
Work related	19	3.36	0.46
Referral related	2	2.39	0.83
Income related	3	2.39	0.76

SD = standard deviation

care and precise ways to achieve the intended outcome. The propensity to treat teenage adults and longer appointments scheduled for follow-up visits and further the rescheduling of failed appointments are all contributory to increased stress levels.

More than three-fourth of the orthodontists that were invited for the survey responded. The comprehensive nature of the study instrument is evident from the detailed descriptive data and the validated stressors used. Moreover, the wider aspect of orthodontic clinical and personal stressors and their contributing factors were analyzed in this study. Majority of the respondents were Saudi nationals who had completed their orthodontic residency programs from Saudi Arabia (45.1%). Although majority of the orthodontists who responded had less than 3 years of experience as a specialist, a minor proportion of them reported having more than 15 years of specialist experience (11.9%). Overall, the participants reported working almost 5 days at an average of 30h per week.

Ten of the 49 potential stressor items evaluated, with a mean score greater than 3.75 [Table 5], were identified to be contributors toward occupational stress among Saudi orthodontists. The aforementioned finding was

in coherence with previous reports in the literature. For instance, “lack of patient compliance” as a stressor with a mean score of 3.99 in this study, has also been reported as one of the most severe occupational stressors as perceived by Canadian orthodontists.<sup>[15]</sup> Similarly, “patients who arrive later than their schedule time” with a mean stress score of 3.95 in this study, has been reported as a common source for stress among dentists and orthodontists.<sup>[15]</sup> Interestingly, these similarities in patient attitude toward dental and orthodontic treatment are prevalent in spite of their differing ethnicities. Furthermore, “motivation of patients with poor oral hygiene” and “treating cases with unfavorable prognosis,” which were found to be highly stressful among Saudi orthodontists, have been reported as potential occupational stressors among practitioners in Britain and Canada.<sup>[15]</sup>

It must be noted that factors such as staff-related problems, unrealistic expectations regarding treatment outcomes, and finding adequate time for personal and family life were found to be less stressful for the orthodontist who participated in this study. However, evidence-based research, among general dental practitioners, has considered the aforementioned factors as more potent occupational stressors.<sup>[22]</sup> Although patient-, work-, and time-related stressors were highly ranked with mean stress scores of 3.38, 3.36, and 3.32, respectively [Table 6], referral- and income-related stressors were the least concerning ones. This is in agreement with previously reported studies, wherein general dentists and dental specialists rated patient- and time-related factors as the major occupational stressors.<sup>[22]</sup> It has been reported that patient education, focusing on oral hygiene maintenance and strict adherence to instructions, helps alleviate occupational stress among orthodontists.<sup>[15]</sup> Moreover, reiterating oral hygiene practices elicits the innate patient-oriented

**Table 5: Comparison of mean overall stress severity score in relation to the sociodemographic, educational, and professional characteristics of study subjects**

Characteristics	Mean (SD)	F value/t value	P value
Age-groups (in years)			
<30	3.37 (0.44)	3.486	0.017*
31–40	3.23 (0.39)		
41–50	3.22 (0.36)		
More than 50	2.94 (0.24)		
Gender			
Male	3.25 (0.39)	0.493	0.623
Female	3.22 (0.41)		
Nationality			
Saudi	3.23 (0.39)	-0.599	0.550
Non-Saudi	3.26 (0.40)		
Academic level (n = 209)			
BDS	3.34 (0.36)	0.569	0.685
MSc	3.25 (0.38)		
PhD	3.26 (0.41)		
Board	3.20 (0.39)		
More than two degrees	3.24 (0.44)		
No. of years in residency training program			
1 and less	3.31 (0.35)	0.913	0.457
2	3.39 (0.46)		
3	3.21 (0.43)		
4	3.20 (0.37)		
5 and above	3.24 (0.36)		
Place of residency program			
Saudi Arabia	3.32 (0.39)	5.425	< 0.0001*
Arab countries	3.26 (0.43)		
Asian countries	3.44 (0.28)		
Europe	3.11 (0.34)		
America	3.04 (0.37)		
Length of experience as orthodontist (in years)			
Less than 3	3.32 (0.43)	1.693	0.170
3–8	3.21 (0.40)		
9–15	3.22 (0.38)		
>15	3.13 (0.27)		
Place of practice			
Private	3.19 (0.44)	0.712	0.640
MOH	3.26 (0.25)		
National guard hospital	3.37 (0.28)		
Security forces hospital	3.23 (0.18)		
Armed forces hospital	3.32 (0.40)		
University clinics	3.28 (0.38)		
More than two places	3.20 (0.48)		

SD = standard deviation

\**p* < 0.05

approach of the practitioner for better results within minimal treatment periods.<sup>[16]</sup>

Although work-related stressors vary according to the individuality of the practitioners,<sup>[6]</sup> orthodontists in our study exclaimed it to be a major stressor. In a recent study, correlating stressors and their coping mechanisms and individual perceptions about the work-related conditions and their willingness to adapt to their environment have been proposed as possible management solutions.<sup>[23]</sup> In addition, musculoskeletal problems due to long appointments and high levels of concentration for a long period have been issues of concern among orthodontist, as evidenced in this study. Unfortunately, long chairside time and solo practice, handling a large number of patients, have always been reported to be stressful among dental specialists and general dentists alike.<sup>[6]</sup> In a study, comparing the levels of stress among orthodontists, restorative dentists, and oral surgeons, it was found that orthodontists experienced relatively lesser stress when compared to other dental specialists.<sup>[24]</sup> This could be due to the ability of orthodontists to respond to personal emergencies by interrupting their clinical work or delaying appointments. In spite of that, orthodontists are reported to be less productive, and they experience greater degree of problems with staff and colleagues, when they are physically and mentally stressed. This eventually leads to a resultant reduction in the standard and quality of clinical work, ending in job dissatisfaction and early career burnout.<sup>[11]</sup>

#### LIMITATIONS

Though our study used a larger sample of orthodontist, we had some limitations as the study population largely composed of males. Also the foreign nationals contributed to a meager percentage of representation. Being a cross sectional study, the effect of coping mechanisms on the potential stressors could not be assessed.

#### CONCLUSION

Evaluation of the occupational stress and determination of the potential stressors among orthodontists in Saudi Arabia showed greater variation. Nevertheless, time management and proper patient education can address the most concerning stressors among the orthodontists

**Table 6: Pearson correlation between overall stress severity score of stress and work-related variables**

Work-related variables	Correlation (r) with severity score	P value
No. of days in a week at work	0.089	0.267
No. of hours in a week, work in the clinic	0.101	0.141
No. of dental chairs/patients deal simultaneously in clinic	-0.016	0.816

and result in improved treatment outcomes. Elimination of inherent causes of these stressors through precise identification can help us develop effective coping mechanisms. Some of the effective coping mechanisms identified include scheduling of varying orthodontic procedure during a day's session, timely intervals, and increasing the level of physical fitness in orthodontists.<sup>[21]</sup> In spite of differences in the endurance levels of individual, inclination toward positive thinking, healthy food habits, passionate working style, and enough rest can augment coping toward the existent occupational stresses in orthodontists.

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#### CONFLICTS OF INTEREST

All the authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

#### AUTHOR CONTRIBUTIONS

As per ICMJE guidelines, the authors involved in this study contributed in the following manner: Alqahtani Nasser D: study conception, data collection, manuscript writing. Shahad Aljajji: data acquisition and analysis. Rana Alshammari: data interpretation. Aljazi Aljabaa: data collection. Mohammad Aldosari: study conception. Albarakati Sahar: study conception.

All the authors approved the final version of the manuscript for publication.

#### ETHICAL POLICY AND INSTITUTIONAL REVIEW BOARD STATEMENT

The institutional review board and ethics committee approved this research project (IR 0187) as per policies of the College of Dentistry Research Center at King Saud University, Riyadh, Saudi Arabia. All the procedures have been performed as per the ethical guidelines laid down by Declaration of Helsinki (year-2013).

#### DECLARATION OF PATIENT CONSENT

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be

reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

#### DATA AVAILABILITY STATEMENT

Data that support the findings of this study will be available from <http://dentksu.occupational-stress-among-saudi-orthodontists.sgizmo.com/s3/>.

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