Research article

Stress and occupational burnout levels among Palestinian dentists, and associated factors: A cross-sectional study in 2023

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A R T I C L E   I N F O

A B S T R A C T

Introduction: Stress and burnout rank among the foremost dentistry-related concerns. Understanding stress and burnout among Palestinian dentists is crucial for developing targeted interventions and support systems. The study aimed to assess stress levels among dentists in Palestine, identify factors contributing to stress, and determine the relationship between stress and burnout in this professional group.

Method: ology: A cross-sectional study was conducted, employing a self-administered questionnaire to gather data from 271 dentists from March to June 2023. The Maslach burnout inventory was utilized to measure burnout across emotional exhaustion, depersonalization, and reduced personal accomplishment dimensions, while the 10-item perceived stress scale was employed to measure stress levels.

Results: The findings revealed that 81% of Palestinian dentists reported experiencing moderate to high levels of stress. Emotional exhaustion was a prominent aspect of burnout, with 48% of participants reporting high levels. The multivariate linear regression analysis demonstrated a significant association between stress scores and female participants ($p = 0.001$), daily sleeping hours ($p = 0.016$), as well as emotional exhaustion and personal accomplishment burnout subscales ($p \leq 0.001$ for both).

Conclusion: The study revealed high-stress levels among Palestinian dentists, which were associated with sex and daily sleep hours. Furthermore, burnout was prevalent among dentists, particularly in terms of emotional exhaustion and personal accomplishment, which were strongly associated with increased stress levels. The results underscore the need for targeted interventions and support mechanisms tailored to factors facing dentists, especially among females and those who receive inadequate sleep. The relationship between burnout and stress levels highlights the intricate connection between these phenomena.

1. Introduction

Stress, an imbalance between individuals and perceived harmful situations, is well recognized as a health status determinant [1].

Extensive research in dentistry highlights stress and anxiety levels among dental professionals that surpass coping capacities, adversely affecting their overall health. This elevated stress, beyond constructive levels, may lead to severe consequences, including life-threatening thoughts such as self-harm. Kay and Lowe found that 12% of dentists admitted to experiencing suicidal thoughts [2].

Dentists face stress from prolonged indoor patient interaction, physical fatigue, limited breaks, addressing patient concerns, managing schedules, and personal traits like perfectionism and self-discipline [3]. These factors posed challenges in preventing the emotional and physical effects of the pressure they endure.

Burnout, caused by prolonged work-related factors, manifests as physical, emotional, and mental exhaustion. Marked by cynicism, depersonalization, and diminished personal accomplishment, it affects various professions, especially healthcare and high-stress environments [4]. Dental workers experienced burnout aligned with the World Health Organization's three dimensions: energy depletion, job-related negativism, and reduced professional efficacy [5]. Studies have highlighted its prevalence among dentists, linking it to high workload, time pressure, emotional exhaustion, limited autonomy, and insufficient social support [6,7].

Stress and burnout, though separate, are often interconnected in the literature. Studies show burnout stems from excessive depletion of time, emotions, and empathy for a job, which leads to adverse outcomes. Unlike burnout, stress does not always lead to burnout and is not consistently associated with decreased work efficacy. Certain healthcare workers (HCWs) exhibit increased productivity during highly stressful periods [8].

Assessment of stress and burnout as a dentistry-related hazard was conducted in various studies [7,9]. Almost 40% of UK dentists experienced high-stress levels, compared with a relatively low percentage (15%) among other working populations [3]. Dentistry presents distinct sources of stress, like financial pressures, the work environment, running after new treatment technologies, and a high workload, including evenings and weekends; dentists may feel overwhelmed by the number of patients they see daily [3,7]. Additionally, they encounter difficulties in managing daily life obstacles, including health-related problems and interpersonal conflicts.

Persistent exposure to occupational stress can result in physical symptoms such as fatigue, low energy, headaches, backaches, hypertension, and chest pain [10,11]. Emotional consequences may include frustration, anxiety, and depression, whereas cognitive effects involve disorientation and negative thoughts. Behavioral outcomes may involve avoiding social gatherings, changes in appetite, and increased reliance on drugs, cigarettes, and alcohol [11].

Ensuring dentists' wellbeing entails prioritizing both their mental and physical health. Several assessment tools for measuring stress are available; the Perceived Stress Scale (PSS) stands out as a commonly employed tool, offering a quick and effective means of screening [12]. Alternatively, the Holmes and Rahe Stress Scale assesses the impact of significant life events, such as divorce, enabling comparisons of stress levels across different populations. Other common stress measurement tools include the Job Content Questionnaire, the Workplace Stress Scale, and the Copenhagen Psychosocial Questionnaire V2 [13].

The Maslach Burnout Inventory-Human Services Survey (MBI-HSS) is the most often utilized and verified instrument for assessing burnout in employees working in sectors like healthcare [14]. It has been validated in different languages; Arabic is one of them [15]. Copenhagen Burnout Inventory measures burnout across three domains: Personal Burnout, Work-related Burnout, and Client-related Burnout. Others include the Burnout Clinical Subtypes Questionnaire with 36 items and the Oldenburg Burnout Inventory. A drawback to these questionnaires is that they all rely on self-reported data in evaluating burnout aspects [15].

Selecting the appropriate stressor exposure for measurement relies on several factors, including the characteristics of the study population, the research question, and the proposed mechanisms connecting various types of stress to the outcome of interest. This study aimed to assess the stress levels of dentist, addressing a significant research gap within Palestine and its neighboring regions. The specific objectives of this study were to identify factors that contribute to stress levels among dentists, and to establish the correlation between stress and burnout within this professional group.

2. Methodology

2.1. Design and population

The cross-sectional research design was employed to assess stress levels among dentists in Palestine from March to June 2023, including the northern, middle, and southern regions of the West Bank. The study included Palestinian dentists working in private and non-private dental clinics in the West Bank's cities. However, we excluded participants who were undergraduate dental students, dental trainees in their vocational year, or dentists who didn't complete the questionnaire.

We used the OpenEpi info software to determine the appropriate sample size, considering the total number of dentists on the West Bank in 2021, which was approximately 4000. Assuming a 5% margin of error and a 95% confidence level, the analysis revealed that a minimum sample of 260 dentists was required. We subsequently increased this number by 20% to account for anticipated non-responses, resulting in a total required sample of 315 dentists. The study participants were selected using a stratified random selection method, wherein each region in the West Bank was considered a separate stratum. Initially, a list of all dentists now engaged in practice within each respective region was undertaken, utilizing the records provided by Palestinian dental syndicates. We randomly selected participants from the provided lists. The number of dentists selected from each region was proportionate to the total number of dentists in that region. Subsequently, we contacted the chosen dentists via telephone and extended an invitation for them to fill out an electronic questionnaire. We distributed the questionnaire via email or WhatsApp, depending on the dentists' preferences.

2.2. Measurement tools and data collection

Data for the study was gathered through a self-administered questionnaire (Supplementary material 1) distributed to participants

who provided consent to participate in the study. A pilot study was undertaken, with a sample of 15 dentists, to assess the measurement tool and correct any potential misconceptions before its implementation among the entire study sample. The questionnaire comprised four sections. The first section covered demographic, educational, work-related, and general health information such as sex, age, residence, marital status, education level, workplace, years of experience, work hours, sleeping hours, smoking habits, physical activity, and health problems. The second part focused on variables related to the profession, including the average number of patients treated daily.

The third section assessed stress levels using the PSS, a widely accepted tool for evaluating stress levels, and an easy, short, self-reported scale that assesses the degree to which an individual considers particular situations in his or her life stressful. The PSS was established in 1983 by Cohen et al. and exhibited satisfactory reliability [16]. Its components measured how individuals view their lives as unpredictable, unmanageable, and burdened by excessive obligations. Additionally, the scale includes items designed to evaluate respondents' current levels of perceived stress. Each item was rated on a 5-point Likert scale, ranging from 0 (never) to 4 (very

Table 1
Demographic, educational, work-related, and general health status.

Variable	Frequency (%)
Sex	
Male	144 (53.1%)
Female	127 (46.9%)
Age	
≤30 years	113 (41.7%)
31–40 years	101 (37.3%)
41–50 years	43 (15.9%)
>50 years	14 (5.2%)
Place of residency	
North West Bank	134 (49.4%)
South West Bank	74 (27.3%)
Middle West Bank	63 (23.2%)
Marital status	
Married	194 (71.6 %)
Single	77 (28.4 %)
Body Mass Index	
Normal weight	126 (46.5 %)
Overweight	105 (38.7 %)
Obese	36 (13.3 %)
Underweight	4 (1.5 %)
Education level	
Bachelor degree	277 (83.8 %)
Postgraduate studies	44 (16.2 %)
Work settings	
Private dental clinic	187 (69.0 %)
Non-private dental clinic	84 (31.0 %)
Years of experience	
0–5 years	105 (38.7 %)
6–10years	57 (21 %)
11–15 years	57 (21 %)
≥16 years	52 (19.2 %)
Work hours per day	
>8 h	158 (58.3 %)
≤8 h	113 (41.7 %)
Work days per week	
>5 days	190 (70.1%)
≤5 days	81 (29.9%)
Treated patients per day	
0–5 patients	110 (40.6%)
6–10 patients	96 (35.4%)
>10 patients	65 (24.0%)
Sleeping hours per day	
<6 h	46 (17.0 %)
6–8 h	212 (78.2 %)
>8 h	13 (4.8 %)
Smoking	
Yes	109 (40.2%)
No	162 (59.8%)
Physically active	
Yes	63 (23.2 %)
No	208 (76.8 %)
Comorbidities	
Yes	104 (38.4 %)
No	167 (61.6%)

often). To calculate the PSS score, the sum of scores for all ten items was computed, and the positively worded items (items 4, 5, 8) were reverse-scored by converting the response scale from 0 to 4 to 4–0. The overall score ranged from 0 to 40, with higher scores indicating greater perceived stress levels. Scores were categorized as 0–13 for low stress, 14–26 for moderate stress, and 27–40 for high stress [17].

The fourth section measured dentists' burnout levels using the MBI-HSS [14]. This tool has been extensively validated, and widely employed in research on job burnout across diverse professions, including HCWs like dentistry, and has exhibited solid internal reliability and validity [14,18]. It consisted of 22 items assessing burnout across three subscales: emotional exhaustion (EE) with nine items and scores ranging from 9 to 54; depersonalization (DP) with five items and scores ranging from 5 to 30; and personal accomplishment (PA) with eight items and scores between 8 and 48. EE and DP were scored on a 7-point Likert scale ranging from 0 (never) to 6 (every day), while PA was scored reversely on the same 7-point Likert scale. The sum of all items in the EE and DP subscales was directly proportional to the burnout intensity, and the opposite was true when interrupting the PA results; higher scores indicated lower burnout levels [19].

EE values were considered mild if they were ≤16, high if they were ≥27, and moderate if they fell in between. For DP levels, ≤6 was classified as low, 7–12 as moderate, and ≥13 as high. In terms of PA, values equal to or exceeding 39 were deemed low, while those between 38 and 32 were considered moderate, and any results at or below 31 were classified as high levels of burnout on this subscale [19].

We used the Arabic versions of PSS and MBI-HSS in this study, and both were proven reliable and valid [20,21]. Cronbach's alpha values were computed to assess the internal reliability of the Arabic versions of PSS and MBI-HSS utilized in this research. The findings revealed a correlation coefficient of 0.860 for PSS and 0.870 for MBI-HSS, suggesting a high level of reliability.

2.3. Data analysis

The collected quantitative data were analyzed using SPSS v.21.0. The descriptive statistics were used to summarize the data distribution and characteristics. We employed the Shapiro-Wilk test to evaluate the normality of the variables, confirming that the data adhered to a normal distribution. We examined the relationship between mean stress scores and independent variables at two levels using the independent *t*-test. The analysis of variance (ANOVA) test was used to compare variables with more than two levels. We further explored the significant ANOVA results with post-hoc tests to identify differences between group means for a given variable. A multivariate linear regression was employed to identify the factors independently related to stress levels. The model incorporated parameters that showed statistical significance in the univariate analysis and other relevant variables highlighted in the literature. We assessed multicollinearity among independent variables using the variance inflation factor in the regression model. No evidence of multicollinearity was observed among the independent variables. The significance level was set at 0.05, and the confidence interval at 95%.

2.4. Ethical considerations

The study received ethical approval from the Institutional Review Board (IRB) at An-Najah National University (Reference #: Med. April 2023/2), and all participants gave their informed consent. We handled the collected information with the utmost confidentiality, protecting personal details. Each participant was assigned a numerical identification for analysis, and we allocated a unique code for every survey.

3. Results

A total of 271 dentists participated in the survey, with a response rate of 86.3%. Nearly half of the respondents were males (53.1%), and the majority (41.7%) were aged 30 or younger; the participant's age mean was 34.46 ± 8.3 years. A high percentage (83.8%) of the dentists held a bachelor's degree without pursuing postgraduate studies. Most dentists (69.0%) worked at private dental clinics,
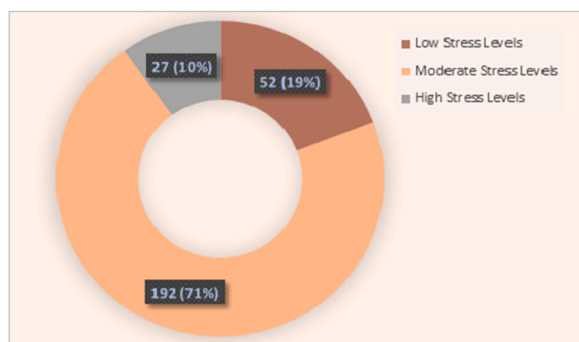

Fig. 1. Distribution of stress levels among Palestinian Dentists: low, moderate and high stress levels (n = 271).

with 190 (70.1%) working more than five days weekly. Additionally, 109 (40.2%) were smokers, and 104 (38.4 %) reported having health problems. Table 1 details further participant characteristics.

The findings regarding stress levels indicated that 224 (81%) dentists experienced a moderate to high level of stress (Fig. 1). We compared the stress level based on demographic and education-related characteristics (Table 2). It was significantly higher among female dentists ($p < 0.001$) and negatively correlated with age, where younger dentists exhibited higher stress levels ($p = 0.014$). Post-hoc analysis showed that stress levels were significantly higher among the 31–40 age group than the 41–50 age group.

Reduced sleeping hours were notably associated with elevated stress levels ($p < 0.001$). Post-hoc analysis revealed a significant correlation across all groups. Dentists with regular physical activity demonstrated lower stress levels ($p < 0.001$). Furthermore, stress levels were significantly higher among dentists who reported health problems (p = 0.009). Table 3 shows the relationship between perceived stress scores and characteristics such as lifestyle, professional data, and work conditions.

Table 4 presents the distribution of burnout subscales among dentists and its relation to stress levels. The results showed varying degrees of burnout across three subscales, with elevated levels of burnout particularly evident in the EE and PA dimensions. Furthermore, increased levels of burnout in the three subscales consistently showed a significant association with higher average stress scores (p < 0.001). The post-hoc tests revealed significant differences among all three groups for each subscale.

Among Palestinian dentists, the prevalent coping mechanism was prayer and worship, followed by sleeping, family support, and sports and friends' support. Fig. 2 outlines the strategies employed to alleviate stress.

We conducted a multiple linear regression analysis based on the variables outlined in Table 5 to predict stress level scores. The study identified several factors that predicted the stress score in the participating dentists, including sex ($p = 0.001$), daily sleeping hours ($p = 0.016$), and MBI scale components: emotional exhaustion ($p < 0.001$) and personal accomplishment ($p < 0.001$). The adjusted R-squared value of the model was 0.440, suggesting that around 44% of the variation in stress scores could be accounted for by the combined impact of these predictors, F (10, 260) = 22.254, p < 0.001, $R^2 = 0.440$.

4. Discussion

Measuring stress levels among HCWs, particularly dentists, is crucial for assessing and promoting these professionals' emotional and mental wellbeing. In this research, 81% of the dentists exhibited moderate to high stress levels (71% and 10%, respectively). These findings align with numerous prior studies that shed light on the prevalent stress within the dental profession across various countries globally [2,22–26]. These results are significant considering that 70.1% worked more than five days a week, which exceeds the working loads determined by the Palestinian labour law, and that 58.3% of Palestinian dentists spent more than one-third of every day at dental clinics. Running behind busy schedules repeatedly would undoubtedly affect the dentist's physical and mental health. In this study, those who exceeded the workload limit changed their means of social interaction by spending less time outside the work frame and scoring higher stress scores (19.5 ± 6). These findings emphasize the necessity of implementing steps to take dentists out of their work-induced solitude and provoke social connections.

Female dentists exhibited notably elevated levels of perceived stress compared to their male counterparts, aligning with findings in similar studies conducted among dentists in various countries, including the United States and Italy [27,28]. One study reported slightly elevated stress levels among female dentists in Pakistan [29], while another study conducted in Yemen found no significant

Table 2
Comparison of mean stress scores with demographic variables and educational levels among Palestinian dentists.

Variable	Perceived stress score	P value
Sex		
Male	17.6 ± 5.5	<0.001
Female	21.0 ± 5.9	
Age		
≤30 years	19.4 ± 5.8	0.014
31–40 years	20.2 ± 5.7	
41–50 years	16.9 ± 6.1	
>50 years	19.2 ± 5.9	
Place of residency		
North West Bank	18.96 ± 5.9	0.06
South West Bank	20.53 ± 5.8	
Middle West Bank	18.24 ± 5.9	
Marital status		
Married	19.4 ± 6.2	0.743
Single	19.2 ± 5.9	
Body Mass Index		
Underweight	19.8 ± 7.1	0.156
Normal weight	20.1 ± 6.0	
Overweight	18.6 ± 5.6	
Obese	18.9 ± 6.0	
Education level		
Bachelor degree	19.4 ± 5.8	0.203
Postgraduate studies	18.2 ± 6.5	

Table 3

Comparative analysis of professional data, work conditions, daily sleep duration, and general health status with mean stress scores among dentists in Palestine.

Variable	Perceived stress score
Work sitting	
Private dental clinic	18.8 ± 6.1
Non-private dental clinic	5.3 ± 5.3
Years of experience	
0–5 years	19.5 ± 5.6
6–10years	19.5 ± 5.8
11–15 years	20.0 ± 6.9
≥16 years	17.3 ± 5.3
Work hours per day	
>8 h	19.5 ± 6.0
≤8 h	19.0 ± 5.8
Work days per week	
>5 days	19.5 ± 5.9
≤5 days	19.1 ± 5.9
Sleeping hours per day	
<6 h	21.3 ± 6.6
6–8 h	19.0 ± 5.5
>8 h	15.1 ± 7.3
Smoking	
Yes	19.1 ± 5.9
No	19.3 ± 5.9
Physically active	
Yes	17.3 ± 6.2
No	19.8 ± 5.7
Comorbidities	
Yes	20.4 ± 5.8
No	18.5 ± 5.8
Treated patients per day	
0–5 patients	19.9 ± 6.0
6–10 patients	19.1 ± 5.8
>10 patients	18.2 ± 5.7

Table 4

Comparison of burnout subscale values with mean stress scores.

MBI subscale	Frequency (%)	Perceived stress score	P value
Emotional Exhaustion			
Low	57 (21%)	14.8 ± 4.9	<0.001
Medium	84 (31%)	17.6 ± 5.0	
High	130 (48%)	22.2 ± 5.2	
Depersonalization			
Low	164 (60.5%)	17.7 ± 5.7	<0.001
Medium	68 (25.1%)	21 ± 5.9	
High	39 (14.4%)	22.5 ± 4.8	
Personal accomplishment			
Low	141 (52%)	17.2 ± 5.2	<0.001
Medium	73 (26.9%)	21.2 ± 6.0	
High	57 (21%)	21.6 ± 5.7	

difference in stress levels based on sex [24]. Females may face pressures to balance professional and family responsibilities shaped by biological, societal, and cultural influences. Female dentists, frequently assuming the role of primary care within their families, faced the challenge of providing quality healthcare to their patients while managing the demands of their personal lives, potentially draining their energy without adequate support [30]. The results highlight the importance of ensuring that female dentists who experience higher levels of perceived stress receive adequate care rather than solely focusing on providing care to others. A supportive work environment and encouraging regular vacations can significantly alleviate stress among female dentists.

On the other hand, there was a clear association between age and stress levels. Specifically, dentists between the ages of 31 and 40 showed higher stress scores than dentists in other age groups. A study by Al-Zubair et al. [24] found Yemeni dentists in the same age group to have increased stress levels. This observation suggests that less experienced dentists may experience heightened stress levels [31]. Our findings agree with a Pakistani study, showing that younger dentists had higher stress levels than those over 40 [29].

The correlation between stress scores and sleep hours was significant (p < 0.016). Dentists who reported sleeping 5 h or less daily exhibited a mean stress score of 21.3 ± 6.6. In contrast, those who slept 6–8 h per day had a considerably lower mean stress score of
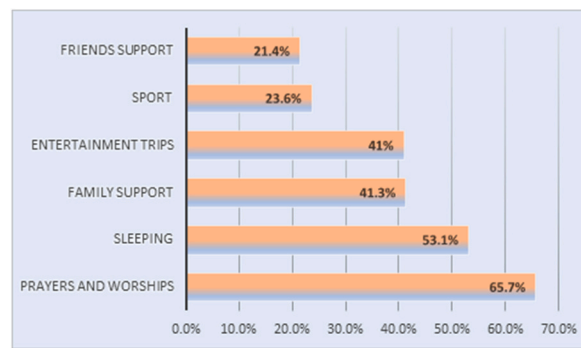
Fig. 2. Stress-mitigating methods employed by Palestinian dentists to cope with work related stress.

Table 5
Multivariate analysis of factors predicting stress levels among dentists in Palestine.

Variable	Unstandardized B	Standardized Coefficient	P value	95% CI
Sex	2	0.17	0.001	0.8–3.2
Age	0.068	0.1	0.918	−1.2–1.4
Sleeping hours per day	−1.5	−0.114	0.016	−2.7–−0.3
Physical activity	0.33	0.023	0.621	-1–1.6
Work settings	0.09	0.007	0.906	−1.3–1.5
Years of experience	−0.19	−0.04	0.741	−1.2–0.9
Comorbidities	0.820	0.068	0.170	−0.4–2
MBI-EE	0.247	0.519	<0.001	0.2–0.3
MBI-DP	−0.030	−0.03	0.631	−0.2–0.1
MBI-PA	−0.148	−0.196	<0.001	−0.2–−0.1

R:0.679, R square: 0.461, adjusted R square: 0.440.

19.0 ± 5.5, while individuals who slept more than 8 h experienced the least stress score of 15.1 ± 7.3. Inadequate nightly sleep could lead to increased stress levels, negatively impacting both the quality and duration of sleep [32]. There is a growing awareness of the connection between sleep and stress [33,34], and our research findings are consistent with other studies. For instance, a Korean study found that 55% of dentists who encountered work stress also reported experiencing sleep disturbances [25]. Considering these results, sleep is crucial in counteracting stress, allowing the body and mind to recover from everyday stressors [35]. It has been chosen as one of the top coping strategies by Palestinian dentists.

Physically active dentists demonstrated significantly lower stress levels than their counterparts ($p = 0.023$). Consistent with existing research, regular physical activity has been shown to positively influence stress by diminishing stress biomarkers such as cortisol levels, thus enhancing stress management. These study results align with established literature on the relationship between stress and physical activity [36], highlighting the importance of sports participation in preventing and addressing stress.

Our study is the first to examine the prevalence of burnout among Palestinian dentists, allowing us to make comparisons with existing research on this subject. In Pakistan, a study found that emotional weariness was the most common sign of burnout. This aligns with our research, where 48% of Palestinian dentists experienced emotional exhaustion as the primary sign of burnout, with DP being the least reported at 14.4% [37].

Our study revealed a strong correlation between burnout subscales and perceived stress levels. Specifically, there was a significant association between EE subscale levels and mean stress scores ($p < 0.000$), indicating that stress levels also tend to increase as EE levels rise. On the other hand, a significant relationship was observed between PA subscale levels and perceived stress ($p < 0.000$); a decrease in PA levels coincides with an increase in stress levels. This aligns with research studies emphasizing the relationship between work-related stress and burnout among HCWs [38,39].

High burnout levels among some dentists may precede an elevation of stress levels, or sometimes, as evidence suggesting elevated levels of burnout may prevent the rising of stress among those who have scored high depersonalization levels, lost empathy with their patients, and lost interest in their wellbeing, which had significantly lowered their reaction towards stressors [40]. Those with high personal accomplishments and low burnout levels may develop stress under pressure to meet goals, expectations, or their own standards. Certain studies suggested that emotional exhaustion induced stress in some patients, heightened depersonalization could reduce stress levels, and increased self-accomplishment could increase stress [8,40]. These findings were emphasized in another study conducted in Italy, where females reported high emotional exhaustion and, at the same time, scored higher perceived stress levels when compared to men, who scored higher depersonalization levels with lower stress levels [28]. Again, higher stress levels were more associated with females than males, who developed depersonalization, disengagement, and blunted emotions. Mounting evidence of these two overlapping concepts has been established and, on some occasions, may suggest burnout as a stress precursor [41].

The findings from the multilinear regression analysis highlight the cumulative influence of multiple variables, including sex, sleep,

EE, and PA, on stress levels. These factors collectively accounted for around 44% of the variation in stress levels, offering significant insights into stress dynamics. Future interventions addressing stress-related issues should consider the valuable information these results provide regarding the determinants of stress. Continuous exposure to stressors without sufficient recovery can lead to a state of chronic, endless stress. In dealing with this, the majority of Palestinian dentists commonly employ various coping strategies for stress. The primary approach involved praying and worship, a practice observed across diverse cultural groups [42] followed by seeking support from family and prioritizing adequate sleep.

One of the study's strengths is that it targeted the entire Palestinian dentist population, increasing the findings' generalizability to the professional community. Furthermore, the study's emphasis on identifying everyday stressors has provided a comprehensive understanding of the factors contributing to stress and occupational burnout among Palestinian dentists, which is critical for establishing tailored interventions and support systems. However, it is essential to interpret the findings with certain limitations in mind. First, while providing a snapshot of stress levels, the cross-sectional design limits the ability to establish causation or assess changes over time. Longitudinal studies would be essential to gain a more comprehensive understanding of stress and burnout dynamics in this population, in which researchers observe the same subjects regularly over time, monitor changes, follow up with participants, and detect patterns of variables of interest and potential predictors that may influence stress and burnout among Palestinian dentists. Second, the study may only partially consider some potential confounding variables influencing stress levels and burnout among dentists. Controlling for additional factors in future research could improve the findings' validity. Third, relying on self-reported data may introduce bias, as participants might underreport or overreport their stress levels; therefore, employing more than one data collection method could help overcome this obstacle.

5. Conclusion

The findings of this study revealed significant stress levels among Palestinian dentists, with a notable proportion experiencing moderate to high stress. Sex and sleeping hours per day were identified as contributors to stress. Moreover, burnout was prevalent among dentists, particularly in terms of emotional exhaustion and personal accomplishment, which were strongly associated with increased stress levels.

The study findings have shown the importance of implementing stress management programs tailored to dentists' specific needs. These programs should prioritize teaching coping mechanisms and resilience-building techniques while tackling workload concerns through strategies to optimize work schedules and patient loads. Advocating for dentists to have regular working hours and incorporating breaks is essential to foster a healthy work-life balance. Developing a supportive work environment that promotes open communication and peer support among dentists can significantly alleviate stress levels.

Consent for publication

"Not applicable."

Funding

Ethics approval and consent to participate

All procedures were carried out in compliance with relevant national guidelines and regulations, laws, and the Declaration of Helsinki. The study and its protocols received approval from the Institutional Review Board committee of An-Najah National University [Reference #: Med. April 2023/2]. All subjects involved in the study were invited to participate voluntarily, and signed an informed consent.

Data availability statement

The data supporting this study's findings are available from the corresponding author, ZN, upon reasonable request.

CRediT authorship contribution statement

Thikrayat Badrasawi: Writing – review & editing, Writing – original draft, Supervision, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Zaher Nazzal:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Formal analysis, Data curation, Conceptualization. **Nabil Massad:** Writing – review & editing, Conceptualization. **Eliana Salameh:** Conceptualization. **Ahmad Ibdah:** Writing – review & editing.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used ChatGPT to improve readability and language. After using this tool, they reviewed and edited the content as needed and took full responsibility for the publication's content.

Declaration of competing interest

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e32034.

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