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Assessment of the importance of sleep quality and the effects of deprivation on Sudanese healthcare professionals amidst conflict in Sudan

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Abstract

Background Quality sleep is vital for well-being, especially for healthcare workers facing high risks of fatigue and burnout. Sleep deprivation impairs cognitive and motor functions, contributing to medical errors. Addressing sleep disorders among healthcare professionals is crucial for enhancing patient care. Tailored interventions are needed to support their well-being and improve healthcare outcomes.

Objective To evaluate the effect of Sleep Quality and its Deprivation on Sudanese Healthcare Professionals amidst conflict in Sudan.

Methods A cross-sectional online survey of Sudanese doctors was conducted using convenience sampling. The questionnaire covered sleep quality, daytime sleepiness, and psychological well-being. Pilot testing ensured questionnaire clarity. Data collection utilized Google Forms distributed through social media and professional networks. A minimum sample size of 384 was calculated. Statistical analysis included descriptive statistics and various tests for significance. Data were securely stored and analyzed using SPSS and R software.

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Results Among 649 participants, 404 (62.2%) were women, with a mean age of 30.34 years. Most were single (434, 66.9%). General practitioners constituted the largest professional group (267, 41.1%), followed by registrars/residents (142, 21.9%). Participants took an average of 43.70 minutes to fall asleep and slept an average of 5.90 hours per night. According to the PSQI, 300 (46.2%) reported mild sleep disturbance, 287 (44.2%) moderate, 42 (6.5%) severe, and only 20 (3.1%) normal sleep. The ESS revealed 285 (43.9%) with lower normal daytime sleepiness, 188 (29.0%) with higher normal, and various levels of excessive daytime sleepiness. Stress levels varied, with 398 (61.3%) reporting normal stress, while anxiety ranged from 248 (38.2%) normal to 148 (22.8%) extremely severe.

Conclusion This study emphasizes the importance of addressing sleep quality, mental health, and performance challenges among Sudanese healthcare professionals. It highlights the need for hospitals to implement measures enabling more time off, adequate sleep, and reduced on-call service days. Healthcare workers must recognize the significance of these factors for their well-being and patient care quality. The research outcomes can raise awareness about the necessity of regulating healthcare practitioners' working hours and ensuring adequate sleep.

Keywords Sleep, Quality, Deprivation, Healthcare, Professionals, Sudan, Conflict

Introduction

"A good laugh and a long sleep are the best cures in the doctor's book,"—an Irish Proverb. Sleep is crucial for the proper functioning of human beings. Both the quantity and quality of sleep have a significant impact on overall well-being (Giri et al. 2013). Healthcare professionals, including doctors, nurses, radiology technicians, and other experts, play a vital role in our healthcare system. However, they are at a higher risk of experiencing fatigue, burnout, and sleep deprivation compared to the general population (Biernat et al. 2012; Kumar 2016).

Sleep deprivation is typically measured by three factors: cognitive performance, motor performance, and mood (Pilcher and Huffcutt 1996; Stewart and Arora 2019). Research has shown that sleep deprivation slows down responses and impairs performance (Killgore 2010). Healthcare workers (HCWs) face sleep disturbances due to rotating or extended-duration shifts and other challenging work situations (Weaver et al. 2020). Burnout and fatigue have become significant concerns, highlighting the need for support systems and interventions tailored to the specific needs of healthcare professionals during crises (Hert 2020). In a cross-sectional study conducted in China, 63.9% of clinical nurses reported sleep disturbances (Dong et al. 2017). In Iran, 53.1% of HCWs experienced sleep disturbances (Ghalichi et al. 2013). Research in China has revealed a wide range in the prevalence of sleep disorders among healthcare practitioners, from 12.9% to a staggering 78% (Lin et al. 2012). However, there has been no investigation into the prevalence of sleep disorders among healthcare professionals in Sudan.

Sleep deprivation, long working hours, and night shifts have been found to contribute to medical errors, such as surgical complications, needlestick injuries, adverse drug events, and misdiagnosis (Ayas et al. 2006; Chaudhury et al. 2012; Mycyk et al. 2005; Lockley et al. 2006). Insufficient sleep among healthcare professionals impairs their neurobehavioral performance, which ultimately affects patient care. Extended working hours are associated with increased alcohol use and unethical behavior, while frequent night shifts and changes in working hours lead to psychological distress (Kim et al. 2018; Muzio et al. 2019). Identifying the factors contributing to sleep disorders is crucial, but it is equally important to implement targeted interventions that address the unique challenges faced by healthcare workers in different settings (Mansukhani et al. 2012; Qiu et al. 2020).

Recognizing the importance of high-quality sleep for healthcare professionals is not only about personal well-being but also about improving patient care outcomes (Kalmbach et al. 2017). As the demands on healthcare professionals continue to evolve, a comprehensive approach is needed to develop effective interventions and strategies that promote their well-being and improve the quality of healthcare delivery to the population they serve (Qiu et al. 2020). Therefore, this study aims to comprehensively evaluate the sleep quality of Sudanese healthcare professionals. We will identify factors contributing to poor sleep quality within this demographic and examine the impact of inadequate sleep on their professional performance. By shedding light on these critical issues, our research aims to contribute to a healthier and more effective healthcare workforce, ultimately leading to improved healthcare delivery for the Sudanese population. This study aimed to evaluate the effect of Sleep Quality and its Deprivation on Sudanese Healthcare Professionals amidst conflict in Sudan.

Methodology

Study design

We conducted a descriptive cross-sectional online survey of Sudanese doctors using convenience sampling. The survey was published on various social media platforms

from 18 to 25 November 2023 and was accessible to anyone with the link. We collaborated with a group of participants to facilitate data collection. No initial contact was made with respondents before starting the study.

Participants

The target population included Sudanese medical professionals, such as officers, residents, specialists, and consultants, who hold a practice license from the Sudan Medical Council, regardless of their location within or outside Sudan.

Instruments

We developed an online self-administered questionnaire based on recent literature (36–39) and with input from faculty members of the Department of Public Health and Community Medicine at the University of Alzaiem Alazhari in Khartoum, Sudan. The questionnaire covered various domains and included both open and closed-ended questions. We distributed it online to Sudanese medical doctors using Google Forms.

The questionnaire covered the following domains:

1. Pittsburgh Sleep Quality Index (PSQI): A generic, 19-item self-rated scale designed to measure overall sleep problems. A score above 5 distinguishes between "good" and "poor" sleepers with high sensitivity and specificity.
2. The Epworth Sleepiness Scale (ESS): A self-administered questionnaire with 8 questions. Respondents rate their usual chances of dozing off or falling asleep on a 4-point scale (0–3) while engaged in eight different activities. The ESS score (the sum of the 8 item scores) can range from 0 to 24. A higher ESS score indicates a higher average sleep propensity in daily life or "daytime sleepiness."
3. Depression, anxiety and stress scale DASS.

Data collection and sampling

To ensure clarity and relevance of the questionnaire, we conducted a pilot study, Based on its feedback, we made improvements to the initial survey questions. Overall, respondents found the majority of the questions to be clear, relevant, and specific. Data collection was carried out using Google Forms, which were distributed to personal and professional networks, as well as through social media platforms like Facebook, WhatsApp, Twitter, and LinkedIn by a group of 26 collaborators. We also shared information about the study on Sudanese social media groups for physicians and sent reminders on days 3 and 7 of the data collection period. In order to ensure the authenticity of the participants, we carefully verified membership in these groups by requesting university certificates and residency documentation for practitioners outside of Sudan. To maintain anonymity and confidentiality, we did not collect respondents' IP addresses. However, Google Forms only allowed for one submission per IP address. Those who declined participation would not continued the survey.by that we ensure the eligibility of the participants.

Sample Size Calculation for this study, we calculated the sample size using the formula $n = z^2 * P(1-P)/d^2$, assuming a 95% confidence interval, a response distribution of 50%, and a margin of error of 0.05. Based on these parameters, a minimum sample size of 384 participants was deemed necessary to represent the population.

Statistical analysis

Responses were securely stored in password-protected Google Sheets, with only the study team having access to the participants' responses. The data was then cleaned and analyzed using the Statistical Package for Social Sciences (SPSS) software version 26. Descriptive statistics, such as frequencies and percentages, were used to summarize the survey responses.

For analysis purposes, R software version 4.0.2 was used. Continuous data were presented as mean ± SD, while categorical data were presented as numbers (percentage). To check for normality of the data, the Kolmogorov–Smirnov test was employed. For groups with normally distributed data, an independent t-test was used to determine significant differences. If the data did not follow a normal distribution, as indicated by rejecting the null hypothesis of the Kolmogorov–Smirnov test, the Mann–Whitney U test was used instead. To identify significant differences between groups for categorical data, either the Chi-square test or Fisher exact test was employed. A *P*-value less than 0.05 was considered statistically significant.

Ethical considerations of the study

The study was approved by the Research and Ethics Committee at the University of Alzaiem Alazhari, Sudan,(the number of the Research Ethics Committee approval is not available), based on its adherence to ethical standards outlined in the 1964 Helsinki Declaration and its later amendments, as well as other approved ethical guidelines. Informed consent was obtained from all participants, and it was integrated into the data collection tool. To ensure a comprehensive and accurate report of the study findings, we followed the Checklist for Reporting Results of Internet E-Surveys (CHERRIES). We confirm that all methods were conducted in accordance with relevant research ethics guidelines and regulations. Prior to

completing the questionnaire, participants were required to provide informed consent, which was included at the beginning of the online questionnaire.

Results

Out of the total 649 participants included in the study, 404 were women, representing 62.2%. The mean age was 30.34 years ± 6.97 standard deviation SD sta, of which 434 (66.9%) were single. The most frequent profession among the participants was general practitioner (267, 41.1%), followed by registrars/residents (142, 21.9%). The mean time it took participants to fall asleep each night in the month prior to the study was 43.70 min ± 45.93 SD, while the mean number of hours they actually slept at night was 5.90 h ± 1.73 SD. The rest of the results are shown in Table 1.

According to the Pittsburgh Sleep Index, the reported results were as follows: mild sleep disturbance (300, 46.2%), moderate sleep disturbances (287, 44.2%), severe sleep disturbances (42, 6.5%), and normal sleep (20, 3.1%).

Based on the Epworth Sleepiness Scale, 285 (43.9%) had lower normal daytime sleepiness; 188 (29.0%) had higher normal daytime sleepiness; 71 (10.9%) had moderate excessive daytime sleepiness; 68 (10.5%) had mild excessive daytime sleepiness; and 37 (5.7%) had severe excessive daytime sleepiness.

Stress categories were reported as follows: normal (398, 61.3%); moderate (93, 14.3%); mild (73, 11.2%); severe (56, 8.6%); and extremely severe (29, 4.5%).

The anxiety categories were as follows: normal (248, 38.2%); extremely severe (148, 22.8%); moderate (136, 21.0%); severe (59, 9.1%); and mild (58, 8.9%).

For all these results, refer to Tables 2, 3, and 4.

Respondents' workplace behaviors and perceptions were diverse. Regarding meeting deadlines, 39.4% usually met them, while 25.4% always did, with 23.9% sometimes meeting them. In terms of taking initiative beyond job requirements, 34.1% sometimes did, while 15.4% always did. 38.4% reported always being willing to learn new things. Regarding tiredness at work, 35.3% usually felt tired, while 19.0% always did. 36.2% usually believed they provided safe practice at work. About 27.7% reported 12-hour shifts did not negatively impact safe practice. Additionally, 51.0% rated their ability to prioritize tasks as good, while 29.4% rated it as excellent.

Table 1 Sociodemographic characteristics of the research participants ($n = 649$)

Characteristics	Value	Frequency	Percent
Age (Mean ± SD)	30.34 ± 6.97		
Sex	Male	245	37.8
	Female	404	62.2
Marital status	Single	434	66.9
	Married	215	33.1
Profession	House officer	77	11.9
	General practitioner	267	41.1
	Registrar/Resident	142	21.9
	Specialist	97	14.9
	Others	66	10.2

Table 5 presents results from Pearson Chi-Square tests, examining associations between various factors and sleep quality (PSQI) and daytime sleepiness (ESS) scales. Significant associations were observed between sex and PSQI ($\chi^2 = 6.399$, $p = 0.094$), sex and ESS ($\chi^2 = 12.478$, $p = 0.014$), as well as stress and PSQI ($\chi^2 = 9.768$, $p = 0.045$). Additionally, profession showed significant association with PSQI ($\chi^2 = 27.512$, $p = 0.007$). These findings indicate potential influences of demographic and professional variables on sleep quality and daytime sleepiness among Sudanese healthcare professionals.

In Table 6, bivariate analysis using Pearson Chi-Square tests explores relationships between various work-related factors and sleep quality (PSQI) and daytime sleepiness (ESS) scales. Significant associations were observed between taking initiative and PSQI ($\chi^2 = 27.491$, $p = 0.036$), willingness to learn new things and ESS ($\chi^2 = 58.973$, $p < 0.001$), and feeling tired while working and PSQI ($\chi^2 = 23.480$, $p = 0.024$). These results suggest that work-related behaviors and attitudes may influence sleep quality and daytime sleepiness among healthcare professionals.

Table 7 displays correlation coefficients between sleep quality (PSQI), daytime sleepiness (ESS), stress, anxiety, and depression. Strong positive correlations were found between PSQI and stress ($r = 0.399$), anxiety ($r = 0.351$), and depression ($r = 0.373$), as well as between ESS and stress ($r = 0.432$), anxiety ($r = 0.446$), and depression ($r = 0.414$). These correlations indicate significant relationships between sleep quality, daytime sleepiness, and mental health factors among Sudanese healthcare professionals. The significant correlations underscore the interconnectedness of sleep quality and mental health, emphasizing the importance of addressing these issues comprehensively in healthcare settings.

Regarding the bivariate analysis, there are strong associations between sex, marital status and profession with the PSQI scale.also the sex is found to be associated with the ESS scale, stress is associated with the sex and marital status, as shown in Tables (5, 6, 7).Correlation is significant at the 0.05 level (2-tailed).

Table 2 Represent the frequency of the PAQI, DASS, and ESS scales

Characteristics	Value	Frequency	Percent
PSQI categories	Normal sleep	20	3.1
	Mild sleep disturbances	300	46.2
	Moderate sleep disturbances	287	44.2
	Severe sleep disturbances	42	6.5
ESS categories	Lower normal daytime sleepiness	285	43.9
	Higher normal daytime sleepiness	188	29.0
	Mild excessive daytime sleepiness	68	10.5
	Moderate excessive daytime sleepiness	71	10.9
	Severe excessive daytime sleepiness	37	5.7
Stress categories	normal	398	61.3
	mild	73	11.2
	moderate	93	14.3
	severe	56	8.6
	Extremely severe	29	4.5
Anxiety categories	normal	248	38.2
	mild	58	8.9
	moderate	136	21.0
	severe	59	9.1
	Extremely severe	148	22.8
Depression categories	normal	280	43.1
	mild	74	11.4
	moderate	171	26.3
	severe	48	7.4
	Extremely severe	76	11.7

Table 3 Shows the statistical measurements of the PAQI, DASS, and ESS scales

Characteristics	Mean	Standard Deviation	Median	Percentile 25	Percentile 75
PSQI scale	10.55	3.34	11.00	8.00	13.00
ESS scale	7.15	5.10	7.00	3.00	11.00
DAS stress scale	13.25	9.86	12.00	5.00	20.00
DAS anxiety scale	11.77	9.49	10.00	4.00	18.00
DAS depression scale	12.68	10.37	12.00	4.00	18.00

Discussion

To our knowledge, this is the first study to comprehensively explore the importance of sleep quality and the effects of deprivation on Sudanese healthcare professionals in resource-restricted and conflict-affected settings like Sudan. Sleep deprivation is a significant issue among healthcare professionals, including doctors, nurses, and other medical staff. The demanding nature of their work, characterized by long hours and irregular shifts, contributes to chronic sleep insufficiency. This problem has serious implications for the health and performance of medical workers, potentially compromising patient care and increasing the risk of errors (Abbas et al. 2021; Al-Maddah 2015; Fadlalmola 2022; Kolo 2017; Landrigan et al. 2004; Lenzo et al. 2021; Liu et al. 2022; Lockley et al. 2004; McClelland et al. 2019; Mohammed et al. 2023; Rosen et al. 2006).

Our study found that the majority of participants experienced poor sleep quality, with only 3.1% reporting normal sleep. According to the Pittsburgh Sleep Quality Index, 46.2% reported mild sleep disturbance, and 44.2% reported moderate disturbances. Similarly, in Saudi Arabia, 71.2% of physicians showed poor sleep quality compared to 28.8% with good sleep quality. We also found high rates of acute and chronic sleep deprivation among KFUH residents, with 85.9% and 63.2% respectively. In

Table 4 Performance at the workplace

Characteristics	Value N (%)				
	Always	**Usually**	**Sometimes**	**Rarely**	**Never**
How often do you meet your deadlines?	165 (25.4)	256 (39.4)	155 (23.9)	49 (7.6)	24 (3.7)
Do you take the initiative to go above and beyond your job requirements?	100 (15.4)	220 (33.9)	221 (34.1)	71 (10.9)	37 (5.7)
Are you willing to learn new things?	249 (38.4)	205 (31.6)	135 (20.8)	42 (6.5)	18 (2.8)
I feel tired while working	123 (19.0)	229 (35.3)	217 (33.4)	60 (9.2)	20 (3.1)
I believe I provide safe practice at work	220 (33.9)	235 (36.2)	146 (22.5)	31 (4.8)	17 (2.6)
Working 12-h shifts does not negatively impact safe practice	145 (22.3)	173 (26.7)	180 (27.7)	74 (11.4)	77 (11.9)
	Excellent	**Good**	**Fair**	**Poor**	**Very poor**
How would you rate your ability to prioritize tasks?	191 (29.4)	331 (51.0)	105 (16.2)	15 (2.3)	7 (1.1)
How well do you communicate with your colleagues and supervisor?	209 (32.2)	321 (49.5)	95 (14.6)	18 (2.8)	6 (0.9)
How would you rate your problem-solving skills?	170 (26.2)	334 (51.5)	111 (17.1)	26 (4.0)	8 (1.2)
Are you able to work independently and as part of a team?	232 (35.7)	279 (43.0)	108 (16.6)	19 (2.9)	11 (1.7)
How well do you handle stress?	123 (19.0)	310 (47.8)	152 (23.4)	47 (7.2)	17 (2.6)
How would you rate your overall performance?	158 (24.3)	336 (51.8)	122 (18.8)	25 (3.9)	8 (1.2)

Table 5 Bivariate analysis of demographic and professional variables with sleep quality, daytime sleepiness, and mental health measures using Pearson Chi-Square test among the study population

Crosstabulation	PSQI		ESS		Stress		Anxiety		Depression	
	chi-x²	***p value***	***chi-x²***	***p value***	***chi-x²***	***p value***	***chi-x²***	***p value***	***chi-x²***	***p value***
Sex	6.399	0.094	12.478	0.014	9.768	0.045	16.212	0.003	20.058	< 0.001
Marital status	8.164	0.043	2.172	0.704	0.605	0.962	1.153	0.886	2.395	0.664
Profession	27.512	0.007	22.119	0.139	27.446	0.037	21.083	0.175	25.299	0.065
PSQI			47.969	< 0.001	78.946	< 0.001	76.991	< 0.001	84.638	< 0.001
ESS					105.278	< 0.001	155.247	< 0.001	112.488	< 0.001

Table 6 Bivariate analysis (Pearson Chi-Square test)

Crosstabulation	PSQI		ESS	
	Chi-x²	***P value***	***Chi-x²***	***P value***
Do you take the initiative to go above and beyond your job requirements?			27.491	0.036
Are you willing to learn new things?	23.973	0.021	58.973	< 0.001
I feel tired while working	23.480	0.024	27.495	0.036
I believe I provide safe practice at work			37.327	0.002
Working 12-h shifts does not negatively impact safe practice	18.170	0.011	23.365	0.014
How well do you communicate with your colleagues and supervisor?			33.361	0.007
How would you rate your problem-solving skills?			30.601	0.015
Are you able to work independently and as part of a team?	29.934	0.003	38.218	0.001
How well do you handle stress?	35.269	< 0.001	39.327	0.001
How would you rate your overall performance?	30.410	0.002	40.452	0.001

Chicago, USA, medical residents reported extremely high sleep deprivation, with over 20% sleeping five hours or less, and 66% averaging six hours or less per night. A systematic review of Chinese healthcare professionals found a 39.2% prevalence of sleep disturbances, higher than the general population prevalence in China which ranges from 9.2% to 20.67%. Additionally, a study in Kano, Nigeria, identified poor overall sleep quality among tertiary

Table 7 Association correlation

		PSQI	ESS	Stress	Anxiety	Depression
PSQI	Pearson Correlation	1	0.271	0.399	0.351	0.373
	Sig. (2-tailed)		0.000	0.000	0.000	0.000
	Covariance	11.143	4.610	13.133	11.112	12.920
ESS	Pearson Correlation	0.271	1	0.432	0.446	0.414
	Sig. (2-tailed)	0.000		0.000	0.000	0.000
	Covariance	4.610	25.984	21.737	21.587	21.853
Stress	Pearson Correlation	0.399	0.432	1	0.814	0.842
	Sig. (2-tailed)	.000	.000		.000	.000
	Covariance	13.133	21.737	97.272	76.203	86.048
Anxiety	Pearson Correlation	0.351	0.446	0.814	1	0.780
	Sig. (2-tailed)	0.000	0.000	0.000		0.000
	Covariance	11.112	21.587	76.203	90.051	76.719
Depression	Pearson Correlation	0.373	0.414	0.842	0.780	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
	Covariance	12.920	21.853	86.048	76.719	107.468

healthcare workers, with 54.2% categorized as poor sleepers and 45.8% as good sleepers. A notable 56.1% reported experiencing daytime sleepiness due to sleep loss, which exceeds rates among Pennsylvania medical residents, ranging from 11% to 36% throughout the academic year.

Another study in Saudi Arabia revealed a 52% prevalence of excessive daytime sleepiness among medical residents in King Fahd University Hospital, further emphasizing the significance of this issue globally among healthcare professionals. The study highlights a significant prevalence of stress, anxiety, and depression among healthcare workers, emphasizing the profound impact on their mental well-being. Anxiety affected 61.8% of healthcare workers, with most experiencing extreme severity (22.8%) followed by moderate severity (21.0%). Stress was reported by 38.7%. In Italy, a study on healthcare workers revealed a prevalence ranging from 21.5% for anxiety to 33.4% for stress. Among Sudanese nurses, approximately 69.5% experienced mild to severe anxiety. Depression affected 56.8% of healthcare professionals, with varying severity levels: moderate (26.3%), mild (11.4%), extremely severe (11.7%), and severe (7.4%), indicating an escalation in symptom severity. In Khartoum State, a study found the most frequent depressive symptoms to be mild (29.9%), followed by moderate (22.9%). Another study on Sudanese nurses indicated that 26.4% experienced mild to severe depression. Among medical residents in Saudi Arabia, a study reported a prevalence of 43.3% for mild depressive symptoms, 15.2% for moderate symptoms, and 4.7% for severe symptoms.

Further analysis revealed robust associations between demographic factors and mental health indicators. Sex, marital status, and profession exhibited strong correlations with sleep quality and stress. These associations can be attributed to various factors. For instance, women may contend with added stressors like familial responsibilities, encompassing household tasks and childcare, along with a potential lack of personal time. The intricate balance between work and family commitments poses challenges for married individuals, potentially leading to heightened stress and feelings of being overwhelmed.

The performance of healthcare professionals is influenced by a mixture of challenges and strengths. A notable 96.9% of professionals reported feeling tired at work, with only 3.1% stating that they never experience fatigue. There is room for improvement, as only 33.9% expressed confidence in providing safe practice. The impact of 12-hour shifts on safe practice is a widely recognized concern among the majority. However, 51.0% of professionals believe their task prioritization skills are good, indicating confidence in managing priorities. Additionally, 39.4% consistently meet deadlines, demonstrating a noteworthy ability to fulfill work timelines. A positive attribute is the willingness to learn, with 38.4% reporting always and 31.6% usually displaying a proactive attitude toward acquiring new knowledge.

Notably, the results demonstrate associations with sleep quality, as measured by the Epworth Sleepiness Scale (ESS) and Pittsburgh Sleep Quality Index (PSQI) scores. This correlation highlights the intricate relationship between sleep quality and various aspects of healthcare professionals' performance, emphasizing the importance of addressing sleep-related factors to optimize effectiveness and well-being in the demanding healthcare environment. Furthermore, studies conducted in the United States, United Kingdom, Ireland,

and Kuwait support these findings. Interns working frequent shifts of 24 hours or more were found to make significantly more serious medical errors compared to those working shorter shifts. Eliminating extended work shifts resulted in improved sleep and decreased attentional failures during night work hours. Healthcare professionals commonly experience sleep disturbance during on-call shifts due to inadequate rest times between shifts. Work-related fatigue negatively impacts health and well-being and increases the frequency of medical errors. In Kuwait, poor sleep quality is also correlated with a higher frequency of medical errors among healthcare professionals.

Conclusion

This study underscores a critical issue for physicians' health programs in Sudan, highlighting the importance for hospitals to implement measures that enable healthcare professionals to take more days off, obtain adequate sleep, and reduce on-call service days. It is imperative for healthcare professionals themselves to acknowledge the significance of these factors in preserving their own health and delivering sustainable healthcare services. This study provides valuable insights into the challenges faced by Sudanese healthcare professionals in terms of sleep quality, mental health, and performance. The findings underscore the urgent need to address sleep-related factors and support the well-being of healthcare workers in order to optimize patient care and minimize the risk of errors.

The research outcomes carry the potential to enhance awareness regarding the imperative of adequate sleep for medical professionals and the necessity to regulate the working hours of healthcare practitioners. It is suggested that a comprehensive guideline detailing the permissible number of working hours and monthly night duties for residents be established. Special considerations for pregnant female healthcare professionals should be explicitly outlined within these guidelines. Regular evaluations of these new guidelines through ongoing studies are recommended.

Furthermore, the authors propose educational initiatives for all healthcare professionals, emphasizing the significance of sleep and its correlation with depression. Healthcare professionals need to develop the ability to recognize symptoms of sleep deprivation and depression, adapting their sleep patterns accordingly.

Limitations

While this online survey provided valuable insights into the Importance of Sleep Quality and the Effects of Deprivation on Sudanese Healthcare Professionals amidst conflict in Sudan, several limitations should be acknowledged. The study's reliance on online data collection and non-probability sampling procedures may have introduced selection bias, as participation was contingent on internet access and familiarity with online surveys, potentially excluding those without internet access. The self-report nature of the survey further widens the possibility of response bias, where participants may provide socially desirable answers or misrepresent their actual experiences. As the survey was conducted amidst conflict, participants' responses could have also been influenced by heightened stress and unique contextual factors. Furthermore, the reliance on quantitative data limits the depth of qualitative insights.

Abbreviations

HCWs	Healthcare workers
PSQI	Pittsburgh Sleep Quality Index
ESS	Epworth Sleepiness Scale
SPSS	Statistical Package for Social Sciences
CHERRIES	Checklist for Reporting Results of Internet E-Surveys
SD	Standard deviation
DASS	Depression, anxiety and stress scale

Authors' contributions

All authors contributed equally to the study. All authors revised the manuscript and approved it for publication.

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Availability of data and materials

No datasets were generated or analysed during the current study.

Declarations

Ethical approval and consent to participate.

Ethical approval of the study was obtained from the IRB of Alzaiem Alazhari University.

Informed written consent from each participant was guaranteed before partaking in the study and confidentiality of the participants was secured.

The study was carried out according to the relevant ethical guidelines and regulations.

Consent for publication

Not applicable.

Competing interest

The authors declare no competing interests.

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