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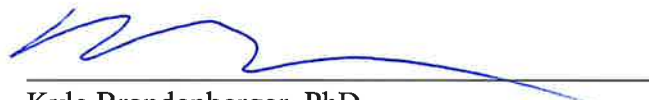
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## ACCEPTANCE


This thesis, THE PREVALENCE OF SLEEP DISTURBANCE AND ANXIETY AMONG SAUDI RESPIRATORY THERAPISTS DURING THE COVID-19 PANDEMIC, was prepared under the direction of the Master's Thesis Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree of Master of Science in the College of Nursing and Health Professions, Georgia State University.

The Master's Thesis Advisory Committee, as representatives of the faculty, certifies that this thesis has met all standards of excellence and scholarship as determined by the faculty.




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3 Apr 23

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Date

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Author

Asim Madkhali

**The prevalence of sleep disturbance and anxiety among Saudi respiratory therapists  
during the COVID-19 winter of 2022.**

**By**

**Asim A. Madkhali, BSRT**

**A Thesis**

**Presented in Partial Fulfillment of Requirements for the**

**Degree of**

**Master of Science**

**in**

**Health Sciences**

**in**

**The Department of Respiratory Therapy**

**Under the supervision of Dr. Kyle Brandenberger, PhD**

**in**

**The Byrdine F. Lewis School of Nursing and Health Professions**

**Georgia State University**

**Atlanta, Georgia**

**2023**

**The prevalence of sleep disturbance and anxiety among Saudi respiratory therapists  
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**By**

**Asim A. Madkhali, BSRT**

**(Under the supervision of Dr. Kyle Brandenberger)**

**ABSTRACT**

**BACKGROUND:** The level of anxiety and sleep disturbances among healthcare providers plays an essential role in overcoming epidemics, especially those on the front lines. It is the responsibility of RTs to provide care to patients with respiratory illnesses. Because of their importance in the health care team, respiratory therapists must have good mental health to do their job to the fullest. It is necessary to identify the subpopulations of healthcare workers who are particularly vulnerable to sleep deprivation and anxiety to characterize them to develop targeted interventions and plan for future crises. **PURPOSE:** The aim of this study was to assess the prevalence of sleep disturbance and anxiety among RTs in Saudi Arabia during the COVID-19 winter of 2022. **METHODS:** The study employed a cross-sectional survey that was conducted online and consisted of 44 questions administered to a convenience sample of RTs in Saudi Arabia. The survey was divided into three parts, which were Pittsburgh Sleep Quality Index (PSQI), Zung Self-Rating Anxiety Scale (SAS), and demographic questions. The data analysis was conducted using SPSS version 27. **RESULTS:** The sample of this research involves 34 respiratory therapists. The majority of the respondents were males 67.6% (n=23), while the females comprised 32.4% (n=11). In addition, 32.4% (n=11) of the participants were from the central region, 14.7% (n=5) were from the east region, 5.9% (n=2) were from the north region and 11.8% (n=4) were from the south region, and 35.3% (n=12) were from the west region. The study showed that the majority of respiratory therapists in Saudi Arabia (79.4%) reported that they had sleep disturbances. The study findings of seven components of the Pittsburg sleep quality index (PSQI) among RTs in Saudi Arabia showed that the component “Sleep latency” was the highest mean score ( $M=1.8 \pm 1.0$ ). The finding revealed that twenty-seven participants out of thirty-four (79.4 %) Reported normal anxiety, with only 20.6% having mild-to-moderate anxiety. Moreover, the study findings indicated no significant difference in sleep disturbances and anxiety levels between RTs in the different regions of Saudi Arabia; sleep disturbances  $H(4) = 5.026, P = .285$ , anxiety  $H(4) = 3.299, P=.509$ . Additionally, the study found no evidence that anxiety statistically correlated with sleep disturbances among RTs in Saudi Arabia. ( $P = 0.139$ ). **Conclusion:** This study provides important insights into the prevalence of sleep disturbances and anxiety among respiratory therapists in Saudi Arabia during the COVID-19 winter of 2022. It is found that a significant proportion of respiratory therapists in Saudi Arabia experienced sleep disturbances. Further research is needed to explore effective strategies to support mental health and quality of sleep among respiratory therapists.

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Asim Madkhali

Spring, 2023

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## **CHAPTER I**

### **Introduction**

Since 2020, COVID-19 has spread rapidly throughout more than 200 countries worldwide and affected their healthcare systems and ability to mobilize resources to contain the spread and reduce morbidity and mortality (Morgantini et al., 2020). A novel Coronavirus Disease (COVID-19) outbreak in December 2019 caused more deaths as a consequence of respiratory infections than any other illness (Alimoradi et al., 2021). The World Health Organization (WHO) reported in July 2022 that there had been more than 552,504,629 known cumulative cases of COVID-19 and 6,347,816 deaths associated with COVID-19 worldwide (WHO Coronavirus (COVID-19) Dashboard). Miller et al. (2021) mention that an increase in burnout was observed among RTs during the COVID-19 pandemic. It has been found that burnout is related to inadequate staffing, an inability to accomplish work, and a burnout climate (Miller et al., 2021).

According to Bahamdan (2021), healthcare workers in Saudi Arabia are experiencing intense psychological and mental effects during the COVID-19 pandemic. After a few weeks of COVID-19 response, frontline healthcare workers in China and Italy, which had the most substantial early outbreaks, experienced an increase in burnout and poor sleep patterns (Wang et al., 2020) (Rossi et al., 2020). In Saudi Arabia, The Ministry of Health reported 800,462 confirmed cases of Covid-19 and 9221 deaths from the beginning of the pandemic until the 11th of July 2020 (Covid-19 Dashboard: Saudi Arabia). Moreover, the COVID-19 pandemic has undoubtedly had a variety of psychosocial and mental consequences on those working in the healthcare industry; nevertheless, we are in a position to increase the overall productivity of

healthcare providers throughout this pandemic by developing mental health interventions (Bahamdan, 2021).

Poor sleep quality is a problem that affects people from all walks of life because of the demands of their jobs (Zeng et al., 2020). COVID-19 exposes healthcare workers to a variety of psychological effects, including psychological distress as well as mental illness (Preti et al., 2020). During the COVID-19 epidemic, there was a high risk of poor sleep quality, anxiety, and mental illness among healthcare workers (Gualano et al., 2020). Gupta et al., 2020 mention that the epidemic has caused symptoms like generalized anxiety and poor sleep quality among healthcare workers, all of which are significantly linked to the availability of personal protective equipment (PPE).

COVID-19 spread worldwide quickly, causing significant strain on healthcare providers, especially those on the front lines regarding pandemic control, such as respiratory therapists (RTs). We have evidence that RTs will have an increased burden from the pandemic. Indeed, there was significant burnout among respiratory therapists in the United States during the COVID-19 pandemic (Miller et al., 2021). It is necessary to identify the subpopulations of healthcare workers who are particularly vulnerable to sleep deprivation and anxiety to characterize them to develop targeted interventions and plan for future crises.

### **Statement of Problem**

As COVID-19 spreads rapidly around the world, significant pressure is being placed on healthcare providers, especially respiratory therapists, at the forefront of pandemic control. There are currently no published research studies that measure the prevalence of sleep disturbance and

anxiety among Saudi respiratory therapists during COVID-19. During this pandemic, it is imperative that mental health infrastructure is improved in order to strengthen the patient-oriented treatment of care plans by developing mental health interventions that can help improve the overall productivity of healthcare providers (Bahamdan, 2021). Bahamdan (2021) highlights the importance of further studies that may lead to the creation of guidelines in Saudi Arabia and around the world.

### **Purpose of the Study**

This study aims to assess the prevalence of sleep disturbance and anxiety among RTs in Saudi Arabia during the COVID-19 winter of 2022. The findings will be used to estimate the Saudi RTs' mental health burden during the COVID-19 winter of 2022. This data will aid in the development of strategies by policymakers to combat the sleep deprivation and anxiety of health professionals caused by pandemics. The research questions that are going to be addressed in this study are:

1. Are respiratory therapists in Saudi Arabia experiencing sleep disturbances during the COVID-19 winter of 2022?
2. Are respiratory therapists in Saudi Arabia experiencing anxiety during the COVID-19 winter of 2022?
3. Are there differences in sleep disturbances and anxiety between RTs in the different regions of Saudi Arabia?
4. Are sleep disturbance and anxiety among Saudi RTs correlated?

## **Significance of the Study**

The study will contribute to evaluating the prevalence of sleep disturbance and anxiety among respiratory therapists during the COVID-19 winter of 2022 in the Kingdom of Saudi Arabia in order to develop guidelines and psychological interventions to improve the quality of life, performance, and decision-making capability of healthcare workers during pandemics.

## **Assumptions**

The level of anxiety and sleep disturbances among healthcare providers plays an essential role in overcoming epidemics, especially those on the front lines. It is the responsibility of RTs to provide care to patients with respiratory illnesses. Because of their importance in the health care team, respiratory therapists must have good mental health to do their job to the fullest. Study participants are expected to respond honestly. This study assumes that participants will answer questions truthfully. Participants worked throughout the pandemic. The effects observed, on average, will be due to pandemic exposure, not some outside influence.

## **Definition of Terms**

Respiratory therapists (RTs): healthcare providers specialize in working therapeutically with people suffering from pulmonary disease.

Coronavirus disease 2019 (COVID-19): a respiratory disease caused by SARS-CoV-2, a coronavirus discovered in 2019.

Sleep disturbance: a disruption in sleep that causes arousal or awakening.

Sleep deprivation: not obtaining adequate total sleep.

Anxiety levels: are typically classified by the level of distress and impairment experienced into four categories: mild anxiety, moderate anxiety, severe anxiety, and extreme anxiety levels.

### **Limitations**

Several factors may limit the study. The study's primary limitation is that its results may not represent what is happening with RTs outside the regions sampled. The survey will be conducted by sending it to the Respiratory Therapy Departments in some hospitals; therefore, participants may not answer accurately and honestly to avoid being negatively represented. This study was conducted during the COVID-19 winter of 2022, which may have had an impact on the results and may not be generalizable to other time periods or other healthcare settings.

### **Delimitations**

Participants in this study were Respiratory Therapists from various regions in Saudi Arabia. In order to answer the research questions, we utilized data provided by currently practicing RTs. Non-RTs, RTs not practicing in Saudi Arabia, and RT students and interns who were on the clinical side during the pandemic are excluded from this research to prevent errors.

### **Summary**

In brief, there is an urgent need to investigate the prevalence of sleep disturbances and anxiety among RTs due to the significant acceleration of COVID-19 cases. This study will give us great feedback from RTs in Saudi Arabia regarding the level of anxiety and sleep disturbances. Finally, this research will assess the prevalence of sleep disturbance and anxiety among RTs, who play an invaluable role in battling COVID-19.

## **CHAPTER II**

### **Review of the Literature**

The purpose of this literature review is to present respiratory therapists' staffing and workload during covid-19, evidence of population sleep disturbances and anxiety during COVID-19, healthcare providers' sleep disturbances and anxiety during COVID-19, and the impact of healthcare providers' sleep disturbances and anxiety on patient care. This review was conducted using Internet searches and online databases such as PubMed, Medline, CINHALL, and Google Scholar. The following keywords were used mutually; respiratory care, respiratory therapy, the role of respiratory therapy, COVID-19, sleep disturbances, anxiety, burnout, populations, healthcare workers, and healthcare providers.

#### **Introduction**

According to the World Health Organization (WHO), COVID-19 is a pandemic, putting healthcare professionals at the front line worldwide in a vulnerable position (COVID-19: Occupational health and safety for health workers: interim guidance, 2 February 2021, n.d.). Consequently, healthcare workers face critical circumstances that put them at risk of suffering from various psychological effects, ranging from psychological distress to symptoms of mental health disorders (Preti et al., 2020). As the epidemic continues to spread, there has been a concurrent increase in the incidence of psychological problems in Saudi Arabia (Iqbal et al., 2021). Moreover, healthcare workers are vital to effectively responding to a pandemic emergency. Healthcare workers (HCWs) face adverse psychological outcomes that may harm their health and hinder their ability to respond effectively to patient health crises (Preti et al.,

2020). In this regard, maintaining the maximum possible care for those affected by such a crisis depends entirely on protecting the healthcare workers' health.

### **Respiratory therapists' staffing and workload during covid-19**

Tu et al. (2020), demonstrate the importance of respiratory therapists in the fight against the new deadly Coronavirus disease (COVID-19) in Wuhan. The respiratory care specialty in China is relatively new, having been around for less than 25 years. The new Coronavirus (COVID-19) crisis in 2019 drew attention to the importance of RTs, which have historically been neglected in China. COVID-19 forced all healthcare institutions in China to endure tremendous pressure during that period because there were insufficient critical care resources (Tu et al. (2020). According to Tu et al. (2020), respiratory therapists were the first line that evaluated the patients by measuring their vital signs, performing chest computed tomography scans, examining their lungs by ultrasound, and checking their blood gas levels. In addition, they collected information about patients' medical history and assisted physicians in categorizing them (Tu et al.,2020).

According to Nichol et al. (2022), Covid-19 patients require respiratory support in many cases. Several respiratory therapy devices are required, including nasal cannulas (NC), high-flow nasal cannulas (HFNC), face masks, non-invasive ventilation (NIV), and invasive mechanical ventilation. Respiratory therapists are required to monitor patients and equipment during this process closely. Therefore, frontline healthcare workers who have direct contact with COVID-19 patients exposes to a significantly higher risk of infection in comparison with the general population (Nguyen et al., 2020).



Healthcare workers are at risk of developing mental health problems associated with the fear of becoming infected while treating COVID-19 patients (Park et al., 2022). The World Health Organization state that a worldwide personal protective equipment (PPE) shortage was crucial during the beginning of the Covid-19 crisis, specifically gowns, gloves, masks, goggles, and face shields. Doctors, nurses, and other frontline personnel are extremely vulnerable to COVID-19 due to a lack of PPE (Shortage of Personal Protective Equipment Endangering Health Workers Worldwide, n.d.). Gupta et al., 2020 mention that the epidemic has caused symptoms like generalized anxiety and poor sleep quality among healthcare workers, all of which are significantly linked to the availability of PPE. HCWs will be more willing to report to work if safety measures, including PPE and working hours, are closely monitored and assessed (Almaghrabi et al., 2020).

Miller et al. (2021) mention that an increase in burnout was observed among RTs during the COVID-19 pandemic. It has been found that burnout is related to inadequate staffing, an inability to accomplish work, and a burnout climate (Miller et al., 2021). In order to assess burnout and leadership dimensions among RTs, a study was conducted between January and March 2021 at 26 sites in the United States. There was a 37 percent response rate to a survey sent to 3,010 RTs. Burnout was reported by 79% of respondents, with 10% experiencing severe burnout, 32% experiencing moderate burnout, and 37% experiencing mild burnout. Evidence suggests that RTs in the United States experienced extensive burnout during the COVID-19 epidemic (Miller et al., 2021).

## **Evidence of population sleep disturbances and anxiety during COVID-19**

To decrease the risk of spreading COVID-19, social distancing and self-isolation was enacted as prevention measures. However, these precautionary procedures have significant impacts on emotional and mental well-being, including chronic insomnia development (Yang et al., 2020). Li et al. (2020) summarized how the COVID-19 pandemic is associated with several predictors of sleep disturbances and suicidal thoughts among Taiwanese people. During the COVID-19 pandemic, authorities should be more attentive to and supportive of this massively undesirable mental health effect (Li et al.,2020). In such circumstances, it is critical to provide timely assistance during epidemic outbreaks (Li et al.,2020),

On March 8, 2020, to prevent the spread of the infection, Saudi Arabia imposed strict lockdowns and self-isolated of the population (Ahmad Alajlan et al., 2021). The Saudi Ministry of Health created two applications called (Tetamman and Mawid) to safeguard the safety of cases and to encourage recovery through educational information, test results, contact information updates, daily patient monitoring, communication with the health hotline center (937), and a countdown indication for self-isolation (Khan et al., 2021). In addition to the clinical deterioration that COVID-19 causes in patients, it also has a significant influence on the psychological well-being of the general Chinese population (Guo et al., 2020). The psychological health of the population and the quality of sleep during the COVID-19 pandemic are, therefore, important factors to consider (Iqbal et al., 2021).

There is a negative effect on the population when self-isolation occurs from all aspects of life, including work, socializing, and other activities (Becker & Gregory, 2020). Previous research found that those who were ordered to stay in quarantine because they might have been

exposed to infectious diseases were more likely to experience negative psychological impacts, such as signs of post-traumatic stress disorder, bewilderment, and rage (Brooks et al., 2020). This circumstance may also cause sleep disruptions (Grandner, 2017). Furthermore, Gualano et al. (2020) found that sleep quality, anxiety, and mental health are negatively affected during Covid-19.

A study by Iqbal et al. (2021) examined anxiety and sleep disturbance levels caused by the COVID-19 outbreak in Saudi Arabia. Since self-isolation and lockdown were royal orders, the public in Saudi Arabia followed strict implementation guidelines. These psychological effects are primarily observed during lockdowns and self-isolation at home due to the outbreak of COVID-19. Iqbal et al. (2021) indicate that Saudi Arabia's general population suffered from sleep disturbances and anxiety due to the pandemic. The association was significant between anxiety and sleep disturbances when in contact with positive COVID-19 patients. The study found sleep deprivation as the result of fear of the pandemic to be the most common mental health issue reported. Sleep disturbances may range from mild to severe in severity (Iqbal et al., 2021).

Iqbal et al. (2021) summarized that as a result of the COVID-19 pandemic, lockdowns impacted a large number of people around the globe. According to their study, Saudi Arabians have poor sleep quality, which indicates that psychological interventions related to COVID-19 should be promoted for better mental health.

## **Healthcare providers' sleep disturbances and anxiety during COVID-19**

There has been a significant problem with poor sleep and high levels of professional burnout among healthcare workers, particularly nurses and doctors, before the COVID-19 pandemic in the United States. In their study, Zeng et al. (2020) found that poor sleep quality is common among nursing staff. Since poor sleep has an adverse effect on health, effective measures need to be taken in order to improve poor sleep quality. Sleep deprivation and burnout have become pervasive among healthcare professionals, affecting not only nurses but also medical students, residents, and practicing physicians (Stewart & Arora, 2019). Likewise, Shanafelt et al. (2015) indicate that from 2011 to 2014, physician burnout and satisfaction with work-life balance deteriorated in the United States. According to Shanafelt et al. (2015), 54.4% (n=3680) of physicians reported at least one burnout symptom in 2014 as opposed to 45.5% (n=3310) in 2011, physicians' satisfaction with work-life balance decreased from 2011 (48.5%) to 2014 (40.9%).

Based on Hassinger et al. (2021), The uncertainty of a once-in-a-century pandemic likely magnifies these problems. After a few weeks of COVID-19 response, frontline healthcare workers in China and Italy, which had the most substantial early outbreaks, experienced an increase in burnout and poor sleep patterns (Wang et al., 2020) (Rossi et al., 2020). Following the pandemic's spread to other countries, frontline healthcare workers in India and Bahrain experienced a deterioration in their mental health as well as a decrease in the quality of their sleep (Gupta et al., 2020) (Jahrami et al., 2021).

Xiao et al. (2020) found that anxiety levels in the medical staff caring for COVID-19 patients affect their psychological well-being in terms of reducing self-efficacy and sleep quality.

According to the findings of a comprehensive study that was carried out at the peak phase of the COVID-19 pandemic in China, healthcare personnel who were treating COVID-19 patients were found to have a significant prevalence of mental health problems, including depression, anxiety, insomnia, and mental distress (Lai et al., 2020). In addition, there is strong evidence that there is a reciprocal dependence between the amount of time spent sleeping and the quality of that sleep and the immune responses against viral, bacterial, and parasite infections, with the latter influencing sleep patterns (Zhang et al., 2020).

Hassinger et al. (2021) recently found changes in several characteristics of sleep among HCWs in all jobs during the first wave of COVID-19 in New York City, which was one of the early epicenters of the pandemic in the United States. In a study by Hassinger et al. (2021) healthy sleep habits were examined across six aspects: Regularity, Duration, Efficiency, Timing, Quality, and Daytime Sleepiness. Hassinger et al. (2021) found evidence that two aspects of sleep deteriorated most dramatically during the pandemic compared with pre-COVID-19 levels. These two aspects include excessive daytime sleepiness and poor sleep efficiency. The number of participants who reported excessive daytime sleepiness before the pandemic was 20.6%; however, during the epidemic, that number nearly doubled, reaching 49.4%. In addition, 42.6% of all participants said that they experienced an increase in daytime sleepiness due to the pandemic. As an indicator of insomnia, "sleep efficiency" decreased in 37.4% of respondents when the epidemic began. The percentage of HCWs who reported having "often" good sleep efficiency decreased from 58.7 to 36.7%.

According to the study by Hassinger et al. (2021), the decline in sleep significantly impacted frontline providers. Instead of nurses, Hassinger et al. (2021) discovered that

physicians, especially resident physicians, were most affected. These findings show that there are repeatable high-risk groups of healthcare professionals who should get interventions designed to recognize and improve their sleep patterns during current and future crises. These data support the notion that future interventions should include incorporating sleep support (Hassinger et al., 2021).

Bahamdan (2021) notes that during COVID-19, an upsurge in depression, stress, and anxiety symptoms has been documented among Saudi Arabians, especially among healthcare staff. Increasing work responsibilities and putting patient care first might negatively impact the mental and physical well-being of healthcare workers (Bahamdan, 2021). Depending on the level of isolation and lack of social support, the risk of spreading a virus to family and friends, as well as frantic, often disturbing shifts in their work obligations, can all negatively affect HCWs' ability to cope and maintain resilience (Pappa et al., 2020). Consequently, HCWs, particularly frontline employees, are more likely than the general population to experience psychological distress and other mental health symptoms after coping with COVID-19 patients in response to this severe scenario (Lai et al., 2020). Moreover, the published findings of psychological distress among healthcare workers may imply that current healthcare systems are unable to protect them adequately (Muller et al., 2020).

Based on the findings of a Bahamdan (2021) study, this study examines the psychological effects of the Covid-19 pandemic on healthcare workers in the kingdom of Saudi Arabia in order to assess their mental health outcomes. In this study, the psychological impact of the COVID-19 pandemic was examined in Saudi Arabia; overall, 60% of the studies reviewed in this article found that a significant percentage (50%) of healthcare workers had anxiety, depression, and

stress as a result of the global emergency. A prolonged fight against a novel virus with an unknown nature is a catastrophe that threatens the viability of healthcare systems (Bahamdan, 2021). When responding to such crises, protecting the health of those responding is crucial to providing the best possible care (Bahamdan, 2021).

Moreover, according to Arafa et al. (2021), in their study in Egypt and Saudi Arabia, during the COVID-19 pandemic, healthcare workers on the frontlines experienced depression, anxiety, stress, and inadequate sleep. Based on the findings of this study, 69% of healthcare workers in Egypt and Saudi Arabia experienced depression during the COVID-19 pandemic, 58.9% experienced anxiety, 55.9% experienced stress, and 37.3% struggled with inadequate sleep. There is also evidence in a study of healthcare workers during COVID-19 conducted in China that distress symptoms are the most common (71.5%), followed by depression (50.4%), anxiety (44.6%), and insomnia (34.0%) (Lai et al., 2020).

According to a review and meta-analysis conducted by Marvaldi et al. (2021), healthcare staff report significant levels of psychological symptoms during the Covid-19 pandemic. These symptoms include anxiety, depression, acute stress, post-traumatic stress, and sleep disturbances. The provision of focused preventative measures and psychological support to HCWs during times of pandemic should be made to ensure the health and well-being of these individuals as well as the quality of the treatment they provide to patients (Marvaldi et al.,2021).

### **The impact of healthcare providers' sleep disturbances and anxiety on patient care**

During the outbreak of severe acute respiratory syndrome (SARS) in Taiwan, a study by Chen et al. (2006) investigated the anxiety, depression, and quality of sleep that nursing

personnel experienced during this time. According to this study, nurses experience symptoms of anxiety, depression, and poor sleep quality. The lack of effective management of the issue resulted in nursing personnel becoming unable to maintain their emotional control and occasionally quitting their jobs as a direct result of the incapacity of the health officials to manage the matter successfully (Chen et al., 2006).

Both professional burnout and poor sleep have been independently associated with adverse outcomes for patients and caregivers, such as medical errors among healthcare practitioners (West et al., 2006). Almaghrabi et al. (2020) note that HCWs may experience psychological repercussions, which may cause them to be fearful of or unwilling to report to work. This may have a negative influence on their productivity as well as the quality of care that they deliver to patients. It is also possible that this will have a negative impact on the healthcare system, particularly during pandemics (Almaghrabi et al., 2020). During the COVID-19 pandemic, those who work in healthcare must take care of their mental and physical well-being in order to ensure that important healthcare services will not be interrupted (Almaghrabi et al., 2020).

Yaghoubi et al. (2022) state that healthcare professionals are among the most susceptible categories during the COVID-19 epidemic in terms of the rate of infection. Also, they assert that as a consequence, HCWs end up as patients, do not show up to work, or perform poorly at work. Since health difficulties can affect healthcare employees' health, health problems can also contribute to absenteeism, presenteeism, and a loss in productivity among healthcare professionals (Yaghoubi et al., 2022). The COVID-19 pandemic has undoubtedly had a variety of psychosocial and mental consequences on those working in the healthcare industry;



nevertheless, we are in a position to increase the overall productivity of healthcare providers throughout this pandemic by developing mental health interventions (Bahamdan, 2021).

## **Summary**

The overwhelming majority of the research on this subject indicates that sleep disturbances and anxiety are prevalent among healthcare professionals during the Covid-19 pandemic. It is critical to understand the level of anxiety and sleep disturbances among healthcare providers to overcome epidemics ultimately. This is especially important for those on the front lines of healthcare delivery. Respiratory Therapists are responsible for providing care to patients who suffer from respiratory diseases. Because of the critical role they play in the health care system, respiratory therapists must maintain a good mental state in order to function effectively in their positions.

## **CHAPTER III**

### **Methodology**

#### **Introduction**

In this study, the researcher explored the prevalence of sleep disturbance and anxiety among Saudi respiratory therapists (RTs) during the COVID-19 winter of 2022. Also, this study showed the prevalence of sleep disturbance and anxiety in different regions of Saudi Arabia. This chapter is organized to describe the methods that will be used to conduct this research.

#### **Research Questions**

The research questions that will investigate in order to help guide the study are:

1. Are respiratory therapists in Saudi Arabia experiencing sleep disturbances during the COVID-19 winter of 2022?
2. Are respiratory therapists in Saudi Arabia experiencing anxiety during the COVID-19 winter of 2022?
3. Are there differences in sleep disturbances and anxiety between RTs in the different regions of Saudi Arabia?
4. Are sleep disturbance and anxiety among Saudi RTs correlated?

#### **Instrumentation**

The questionnaire has three sections: the first section consists of 6 questions focused on demographic data that the questionnaire seeks to gather. There are 18 questions in the second section concerning sleep quality, the Pittsburgh Sleep Quality Index (PSQI) (Buysse et al.,

1989). The PSQI is a valid and effective instrument for assessing the quality and pattern of sleep among adults, which has been validated. In order to differentiate "poor" sleep from "good" sleep, it measures seven areas: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction. Based on the Likert scale, the participants will self-rated each of these seven sleep areas on a scale of 0 to 3, with 3 corresponding to the negative extreme. The third section contains the Zung self-rating anxiety scale (SAS) (Zung, 1971), which is a self-report scale containing 20 items that identify anxiety levels using Likert scale responses (a little of the time, sometimes, good part of the time, most of the time), the SAS raw scale score can range from 20 to 80 (Dunstan & Scott, 2020).

## **Population**

The inclusion criteria in this study are a sample of practicing RTs in Saudi Arabia who are Registered with the Saudi Commission for Health Specialties and who are practicing in Saudi Arabia in public or private healthcare facilities. The Exclusion criteria are Non-RTs, RTs not practicing in Saudi Arabia, and RT students and interns who were on the clinical side during the pandemic. The target sample size is 26 participants.

## **Study design**

The study design for this research involves an online, cross-sectional survey in Saudi Arabia. Qualtrics through the Georgia State University website will be used to administer the survey and collect the data. In accordance with IRB approval, an online survey link was sent to some hospitals' RT department heads, who distributed the survey to employees via their work email. Reminders were sent to the same emails for two weeks. The survey also stated that

participation in this study is voluntary and that participants have the right to withdraw from the study at any time and without explanation. The survey is divided into three sections: (1) the Pittsburgh Sleep Quality Index (PSQI), (2) the Zung self-rating anxiety scale (SAS), and (3) demographic data.

### **Data analysis**

In the study, SPSS (version 27) was used to analyze and evaluate all the statistical studies that were included in the study. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were conducted to assess the prevalence of sleep disturbances and anxiety among RTs in Saudi Arabia, in addition to determining the differences between different regions in Saudi Arabia regarding the prevalence of sleep disturbances and anxiety.

### **Confidentiality**

The study proposal was submitted to the Institutional Review Board (IRB) at Georgia State University. Human subjects' protection measures shall be carefully enforced. When a participant returned a questionnaire for this study, they were deemed to have given their permission. The survey's anonymity and confidentiality were ensured. Additionally, participants were not required to utilize email to submit their comments when the survey was conducted online, which eliminated any possibility of indirect identification. All surveys were removed when data analysis was completed.

## **Informed consent**

Clicking the "agree" button will result in the participant giving their consent to take part in the study. Participants will be allowed to respond to the survey questions once they have provided their informed consent. However, if at any point during the research, the participants feel that they cannot safely continue with the study, they will be given the option to quit at any time.

## **Summary**

Overall, the methodology aims to assess the prevalence of sleep disturbance and anxiety among Saudi respiratory therapists during the COVID-19 winter of 2022. This chapter presented information on the research questions, instrumentation, population, study design, and data analysis that will be applied to the study. The instrument will assess sleep disturbances and anxiety levels.

## CHAPTER IV

### FINDINGS

#### Overview

This research aimed to evaluate the prevalence of sleep disturbance and anxiety among respiratory therapists in Saudi Arabia. This chapter presents the results of the statistical analysis as well as the demographic information of participants. Statistical Package for the Social Sciences 27 (SPSS 27) was employed to conduct the statistical analysis. Descriptive statistics, correlation, and Kruskal-Wallis tests were conducted to assess the RTs' sleep disturbance and anxiety. The findings will be presented separately in relation to the following research questions.

#### Research Questions

1. Are respiratory therapists in Saudi Arabia experiencing sleep disturbances during the COVID-19 winter of 2022?
2. Are respiratory therapists in Saudi Arabia experiencing anxiety during the COVID-19 winter of 2022?
3. Are there differences in sleep disturbances and anxiety between RTs in the different regions of Saudi Arabia?
4. Are sleep disturbance and anxiety among Saudi RTs correlated?

#### Demographic Findings

The sample covers RTs who are currently practicing respiratory care professionals in Saudi Arabia. The demographic data was collected to present a description of the population, (see table 1). The sample of this research involves 34 respiratory therapists. There were 67.6%

(n=23) male and 32.4% (n=11) female respondents. Moreover, undergraduate degrees (BS) accounted for 91.2% (n=31) of the participants, while 8.8% (n=3) were graduate degrees (MS). In addition, 32.4% (n=11) of the participants were from the central region, 14.7% (n=5) were from the east region, 5.9% (n=2) were from the north region and 11.8% (n=4) were from the south region, and 35.3% (n=12) were from the west region. The majority of respondents 88.2% (n=30) have less than five years of experience working in a clinical setting. In contrast, 2.9% have five to ten years of experience and 8.8% have more than ten years of experience.

**Table 1. Demographic data of Respiratory Therapists in Saudi Arabia. N=34**

<b>Demographics</b>	<b>N</b>	<b>%</b>
<b>Gender</b>		
Male	23	67.6
Female	11	32.4
<b>Education Level</b>		
Bachelor's Degree	31	91.2
Master's Degree	3	8.8
<b>Experience in the field</b>		
1-2 years	13	38.2
2-5 years	17	50.0
5-10 years	1	2.9
More than 10 years	3	8.8
<b>Type of healthcare facility</b>		
Public hospital	31	91.2
Private hospital	3	8.8

<b>Treated COVID-19 Patients</b>		
Yes	32	94.1
No	2	5.9
<b>Region of Practice</b>		
Center	11	32.4
East	5	14.7
North	2	5.9
South	4	11.8
West	12	35.3

### Missing Data

All the incomplete responses were not used in the study.

### Findings Related to Research Question 1

The first research question asked, "Are respiratory therapists in Saudi Arabia experiencing sleep disturbances during the COVID-19 winter of 2022?" Table 2 shows percentages, mean (M), and standard deviations (SD) of 15 questions that measure sleep disorders among respiratory therapists according to the Pittsburg sleep quality index (PSQI). The ranges were based on a four-point Likert scale based on the number of times they experience during the past month ranging from 0 = no difficulty to 3 = severe difficulty.

Table 3 presents mean scores (M) and standard deviations (SD) of seven components of the Pittsburg sleep quality index (PSQI) that were calculated, each component section ranged from 0 = no difficulty to 3 = severe difficulty. The findings of seven components of the Pittsburg



sleep quality index (PSQI) among RTs in Saudi Arabia showed that the component “Sleep latency” was the highest mean score ( $M=1.8 \pm 1.0$ ). In contrast, the component “Use of sleep medication” was the lowest mean score ( $M=0.4 \pm 0.8$ ).

**Table 2. The Pittsburg Sleep Quality Index among RTs in Saudi Arabia.**

<b>During the past month,</b>	<b>Category</b>	<b>N</b>	<b>%</b>	<b>Mean</b>	<b>Std. Deviation</b>
how long (in minutes) has it taken you to fall asleep each night?	0. 15 min or less	7	20.6	1.32	.976
	1. 16-30 min	14	41.2		
	2. 31-60 min	8	23.5		
	3. More than 60 min	5	14.7		
Cannot get to sleep within 30 minutes	0. Not during the past month	6	17.6	1.74	1.136
	1. Less than a once a week	9	26.5		
	2. Once or twice a week	7	20.6		
	3. Three or more a week	12	35.3		
Wake up in the middle of the night or early morning	0. Not during the past month	5	14.7	1.76	1.046
	1. Less than a once a week	8	23.5		
	2. Once or twice a week	11	32.4		
	4. Three or more a week	10	29.4		
Have to get up to use the bathroom	0. Not during the past month	9	26.5	1.26	1.053
	1. Less than a once a week	13	38.2		
	2. Once or twice a week	6	17.6		
	3. Three or more a week	6	17.6		
Cannot breathe comfortably during sleeping	0. Not during the past month	25	73.5	.47	.896
	1. Less than a once a week	4	11.8		
	2. Once or twice a week	3	8.8		
	3. Three or more a week	2	5.9		
Cough or snore loudly at sleeping	0. Not during the past month	22	64.7	.53	.825
	1. Less than a once a week	7	20.6		
	2. Once or twice a week	4	11.8		
	3. Three or more a week	1	2.9		
Feel too cold at sleeping	0. Not during the past month	15	44.1	1.03	1.114
	1. Less than a once a week	8	23.5		
	2. Once or twice a week	6	17.6		
	3. Three or more a week	5	14.7		
Feel too hot at sleeping	0. Not during the past month	16	47.1	.94	1.099
	1. Less than a once a week	9	26.5		
	2. Once or twice a week	4	11.8		

	3.	Three or more a week	5	14.7		
Have bad dreams	0.	Not during the past month	12	35.3	1.21	1.122
	1.	Less than a once a week	9	26.5		
	2.	Once or twice a week	7	20.6		
	3.	Three or more a week	6	17.6		
Have pain	0.	Not during the past month	19	55.9	.79	1.067
	1.	Less than a once a week	7	20.6		
	2.	Once or twice a week	4	11.8		
	3.	Three or more a week	4	11.8		
Other reason(s)	0.	Not during the past month	27	79.4	.44	.960
	1.	Less than a once a week	2	5.9		
	2.	Once or twice a week	2	5.9		
	3.	Three or more a week	3	8.8		
how often have you taken medicine (prescribed or “over the counter”) to help you sleep?	0.	Not during the past month	26	76.5	.38	.817
	1.	Less than a once a week	5	14.7		
	2.	Once or twice a week	1	2.9		
	3.	Three or more a week	2	5.9		
How often have you had trouble staying awake while driving, eating meals, or engaging in social activity?	0.	Not during the past month	13	38.2	1.00	1.015
	1.	Less than a once a week	12	35.3		
	2.	Once or twice a week	5	14.7		
	3.	Three or more a week	4	11.8		
How much of a problem has it been for you to keep up enthusiasm to get things done?	0.	Not during the past month	8	23.5	1.26	.963
	1.	Less than a once a week	13	38.2		
	2.	Once or twice a week	9	26.5		
	3.	Three or more a week	4	11.8		
How would you rate your sleep quality overall?	0.	Very good	3	8.8	1.21	.641
	1.	Fairly good	22	64.7		
	2.	Fairly bad	8	23.5		
	3.	Very bad	1	2.9		

Note. 0 = no difficulty to 3 = severe difficulty.

**Table 3. The components of the Pittsburg sleep quality index (PSQI).**

Component	N	Minimum	Maximum	Mean	Std. Deviation
Subjective sleep quality	34	0	3	1.21	.641
Sleep latency	34	0	3	1.79	1.038
Sleep duration	34	0	2	1.03	.758
Sleep efficiency	34	0	3	.68	1.007

Sleep disturbance	34	0	3	1.35	.691
Use of sleep medication	34	0	3	.38	.817
Daytime dysfunction	34	0	3	1.35	.812

Note. 0 = no difficulty to 3 = severe difficulty.

Table 4 and 5 represents the frequency and percent of the global PSQI score among respiratory therapists in Saudi Arabia. The scores range from 0 to 21, a score of 5 or under are “good sleepers” and a score above 5 is considered a significant sleep disturbance (severe difficulties) in at least 2 areas. Accordingly, the findings from the Pittsburg sleep quality index (PSQI) showed significant sleep disturbance among RTs in Saudi Arabia.

**Table 4. The Global PSQI Score among RTs in Saudi Arabia.**

The global PSQI score	N	%
1	1	2.9
3	2	5.9
4	2	5.9
5	2	5.9
6	5	14.7
7	3	8.8
8	9	26.5
9	2	5.9
10	2	5.9

11	1	2.9
12	2	5.9
13	1	2.9
14	1	2.9
16	1	2.9

**Table 5. The Global PSQI Score among RTs in Saudi Arabia**

<b>The global PSQI score</b>	<b>Frequency</b>	<b>Percent</b>
Good Sleepers	7	20.6
Poor Sleepers	27	79.4

### **Findings Related to Research Question 2**

The second research question asked, "Are respiratory therapists in Saudi Arabia experiencing anxiety during the COVID-19 winter of 2022?" measuring the anxiety rate among RTs in Saudi Arabia was assessed using SAS. Table 6 showed the main findings and revealed that anxiety to most RTs was not considered as a worrying disorder as the vast majority were normal with only 20.6% having mild-to-moderate anxiety.

Zung Self-Rating Anxiety Scale (SAS) differentiates the scores based on four categories, (20-44, normal), (45-59, mild-to-moderate anxiety), (60-74, moderate-to-severe anxiety), and (75-80, extreme anxiety). Analysis of each participant's scores is reported in Table 7.

**Table 6. Anxiety score among RTs in Saudi Arabia using the Zung self-rating anxiety scale (SAS).**

<b>Question</b>	<b>A little of the time</b>	<b>Some of the time</b>	<b>Good part of the time</b>	<b>Most of the time</b>	<b>Mean</b>	<b>Std. Deviation</b>
1. I feel more nervous and anxious than usual.	16	15	3	0	1.62	.652
%	47.1	44.1	8.8	0		
2. I feel afraid for no reason at all.	17	11	5	1	1.71	.836
%	50.0	32.4	14.7	2.9		
3. I get upset easily or feel panicky.	14	11	7	2	1.91	.933
%	41.2	32.4	20.6	5.9		
4. I feel like I'm falling apart and going to pieces.	15	14	5	0	1.71	.719
%	44.1	41.2	14.7	0		
5. I feel that everything is all right and nothing bad will happen.	12	9	10	3	2.12	1.008
%	35.3	26.5	29.4	8.8		
6. My arms and legs shake and tremble.	20	6	4	4	1.76	1.075
%	58.8	17.6	11.8	11.8		
7. I am bothered by headaches neck and back pain.	13	12	5	4	2.00	1.015
%	38.2	35.3	14.7	11.8		
8. I feel weak and get tired easily.	11	12	8	3	2.09	.965
%	32.4	35.3	23.5	8.8		
9. I feel calm and can sit still easily.	11	8	8	7	2.32	1.147
%	32.4	23.5	23.5	20.6		
10. I can feel my heart beating fast.	18	10	4	2	1.71	.906

%	52.9	29.4	11.8	5.9		
11. I am bothered by dizzy spells.	21	8	4	1	1.56	.824
%	61.8	23.5	11.8	2.9		
12. I have fainting spells or feel like it.	24	7	3	0	1.38	.652
%	70.6	20.6	8.8	0		
13. I can breathe in and out easily.	7	4	7	16	2.94	1.205
%	20.6	11.8	20.6	47.1		
14. I get feelings of numbness and tingling in my fingers & toes.	22	8	3	1	1.50	.788
%	64.7	23.5	8.8	2.9		
15. I am bothered by stomach aches or indigestion.	17	5	6	6	2.03	1.193
%	50.0	14.7	17.6	17.6		
16. I have to empty my bladder often.	16	7	7	4	1.97	1.087
%	47.1	20.6	20.6	11.8		
17. My hands are usually dry and warm.	13	8	8	5	2.15	1.105
%	38.2	23.5	23.5	14.7		
18. My face gets hot and blushes.	20	6	5	3	1.74	1.024
%	58.8	17.6	14.7	8.8		
19. I fall asleep easily and get a good night's rest.	7	12	10	5	2.38	.985
%	20.6	35.3	29.4	14.7		
20. I have nightmares.	22	5	5	2	1.62	.954
%	64.7	14.7	14.7	5.9		

**Table 7. Anxiety level score among RTs in Saudi Arabia.**

Anxiety level	N	%
Normal Range	27	79.4
Mild to Moderate Anxiety	7	20.6
Moderate to Severe Anxiety	0	0
extreme anxiety	0	0

**Findings Related to Research Question 3**

The third research question asked, "Are there differences in sleep disturbances and anxiety among RTs in the different regions of Saudi Arabia?" A Kruskal-Wallis Test revealed no significant difference in sleep disturbances and anxiety levels between RTs in the different regions of Saudi Arabia; sleep disturbances ( $H(4) = 5.026$ ), ( $P = .285$ ), anxiety ( $H(4) = 3.299$ ), ( $P = .509$ ), (see table 8 and 9). So, the regions in which RTs practiced did not significantly affect the overall number of RTs who have sleep disturbances and anxiety.

**Table 8. Comparison of sleep disturbances and anxiety among RTs in the different regions of Saudi Arabia.**

	Region	N	Mean Rank
PSQI Score	South region	4	16.75
	North region	2	12.50
	Middle region	11	14.82
	East region	5	21.00
	West region	12	19.58
	Total	34	
Anxiety Level	South region	4	14.00
	North region	2	22.50

	Middle region	11	17.09
	East region	5	20.80
	West region	12	16.83
	Total	34	

**Table 9. Comparison of sleep disturbances and anxiety among RTs in the different regions of Saudi Arabia.**

	PSQI Score	Anxiety Level
Kruskal-Wallis H	5.026	3.299
df	4	4
Asymptotic Sig.(2-sided test)	.285	.509

- a. Kruskal Wallis Test
- b. Grouping Variable: Region

#### **Findings Related to Research Question 4**

The fourth research question asked, “Are sleep disturbance and anxiety among Saudi RTs correlated?” Our results indicate that there was no statistically significant correlation between sleep disturbance and anxiety levels among RTs in Saudi Arabia. In other words, the study found that anxiety does not have a significant impact on sleep disturbance among RTs in Saudi Arabia.

The study used statistical analysis to examine the relationship between sleep disturbance and anxiety levels among RTs in Saudi Arabia. The findings showed that there was no significant correlation between sleep disturbance and anxiety levels among the participants. The P-value was 0.139, which is higher than the alpha level of 0.05, indicating that the results were not significant (see tables 4, 7, and 10).



**Table 10. Correlations between sleep disturbances and anxiety among RTs in Saudi Arabia.**

		<b>PSQI Score</b>	<b>Anxiety Level</b>
<b>PSQI Score</b>	Pearson Correlation	1	.259
	Sig. (2-tailed)		.139
	N	34	34
<b>Anxiety Level</b>	Pearson Correlation	.259	1
	Sig. (2-tailed)	.139	
	N	34	34

## **CHAPTER V**

### **Interpretation of Findings**

This chapter will present a discussion of the findings presented in Chapter IV. The chapter is divided into six major sections: an overview of the study, a discussion of findings, implications for research, future research recommendations, limitations of the study, and a conclusion.

#### **Overview of the Study**

This study aimed to assess sleep disturbances and anxiety levels among respiratory therapists in Saudi Arabia. The research questions that were investigated in the discussion in order to help guide the study were:

#### **Research Questions**

1. Are respiratory therapists in Saudi Arabia experiencing sleep disturbances during the COVID-19 winter of 2022?
2. Are respiratory therapists in Saudi Arabia experiencing anxiety during the COVID-19 winter of 2022?
3. Are there differences in sleep disturbances and anxiety between RTs in the different regions of Saudi Arabia?
4. Are sleep disturbance and anxiety among Saudi RTs correlated?

## **Discussion of Findings**

### **Findings Related to Research Question 1**

The first research question asked, “Are respiratory therapists in Saudi Arabia experiencing sleep disturbances during the COVID-19 winter of 2022?” According to our study, the majority of respiratory therapists in Saudi Arabia (79.4%) reported that they experienced sleep disturbances. The study findings of seven components of the Pittsburg sleep quality index (PSQI) among RTs in Saudi Arabia showed that the component “Sleep latency” was the highest mean score ( $M=1.8 \pm 1.0$ ). In contrast, the component “Use of sleep medication” was the lowest mean score ( $M=0.4 \pm 0.8$ ). These findings agree with Stewart & Arora (2019), who asserts that sleep deprivation and burnout have become pervasive among healthcare professionals, affecting not only nurses but also medical students, residents, and practicing physicians. Likewise, the majority of HCWs during COVID-19 reported a decline in sleep along with an increase in daytime drowsiness and insomnia. (Hassinger et al., 2021). Moreover, frontline healthcare workers in India (Gupta et al., 2020) and Bahrain (Jahrami et al., 2021) experienced a deterioration in their mental health as well as a decrease in the quality of their sleep during COVID-19.

### **Findings Related to Research Question 2**

The second research question asked, “Are respiratory therapists in Saudi Arabia experiencing anxiety during the COVID-19 winter of 2022?” According to our study, twenty-seven participants out of thirty-four (79.4 %) Reported normal anxiety, with only 20.6% having mild-to-moderate anxiety. These findings were inconsistent with previous studies among healthcare providers. Bahamdan (2021) notes that overall, 60% of the studies reviewed in his

article found that a significant percentage (50%) of healthcare workers had anxiety, depression, and stress. Arafa et al. (2021), in their study in Egypt and Saudi Arabia, during the COVID-19 pandemic, healthcare workers on the frontlines experienced depression, anxiety, stress, and inadequate sleep. Based on the findings of this study, 58.9% of healthcare workers in Egypt and Saudi Arabia had anxiety. Our study was conducted late in the COVID-19 pandemic, which may have had an impact on the results and may not be generalizable to other time periods.

### **Findings Related to Research Question 3**

The third research question asked, “Are there differences in sleep disturbances and anxiety between RTs in the different regions of Saudi Arabia?” The study result showed that no significant difference in sleep disturbances and anxiety levels between RTs in the different regions of Saudi Arabia; sleep disturbances  $H(4) = 5.026, P = .285$ , anxiety  $H(4) = 3.299, P = .509$ . The study revealed that the regions in which RTs practiced did not significantly affect the overall number of RTs who have sleep disturbances and anxiety. We found no evidence that the region affected sleep disturbances and anxiety among RTs in Saudi Arabia. The reason that there are no differences in sleep disturbances and anxiety among RTs in the different regions of Saudi Arabia can be significantly attributed to the fact that the Saudi Ministry of Health controls more than 60% of the country's healthcare system. (Al-Otaibi & AlAhmari, 2016). Therefore, we assume that the workplace environments for respiratory therapists in Saudi Arabia are comparable.

#### **Findings Related to Research Question 4**

The fourth research question asked, “Are sleep disturbance and anxiety among Saudi RTs correlated?” Our findings show that anxiety levels and sleep disruption do not appear to be statistically correlated with one another ( $P = 0.139$ ). We found no evidence that anxiety affected sleep disturbances among RTs in Saudi Arabia. These results are in contrast with some previous studies that have reported a significant association between sleep disturbance and anxiety among healthcare professionals. For example, a study conducted in China showed that sleep disturbance was significantly correlated with anxiety (Wang et al., 2020). Gupta et al., (2020) revealed a statistically significant correlation between anxiety and sleep disturbances, showing a worse quality of sleep as the GAD-7 score increased ( $P < .001$ ). This indicates that medical workers who reported higher levels of anxiety were more likely to experience sleep disturbances during the COVID-19 outbreak. However, in our study, only 20.6% reported having mild-to-moderate anxiety. It is important to note that the sample size in this study was relatively small, which may have affected the statistical power to detect significant associations. The timing of our study was towards the end of the COVID-19 pandemic, and it is possible that the outcomes may have been influenced by this factor.

#### **Implications for Research**

The findings of this study have important implications for future research in the field of respiratory therapy, particularly in the context of sleep disturbances and anxiety levels. The high prevalence of sleep disturbances among respiratory therapists in Saudi Arabia highlights the need for further research to understand the underlying causes of sleep deprivation in this population. Healthcare organizations need to recognize the impact of sleep disturbances and anxiety levels

among respiratory therapists and provide adequate support for their employees, such as counselling, stress management programs, and flexible work schedules. Although no significant difference was found in sleep disturbances and anxiety levels between RTs in different regions of Saudi Arabia, healthcare organizations should be aware of the potential impact of regional differences and consider tailoring their support programs accordingly. The results of this study may be useful for developing interventions to support healthcare workers in Saudi Arabia or other countries and implement support programs for their employees. Lastly, the findings of this research will add to the literature, given that it is the first research that assessed sleep disturbances and anxiety levels among RTs in Saudi Arabia.

### **Recommendations for Future Research**

Several recommendations for future research can be made. Firstly, future studies should explore the potential effectiveness of interventions aimed at reducing sleep disturbances among respiratory therapists. Secondly, replication with a larger number of participants is recommended as a method for validating the findings of this study. Finally, future research should also examine the potential impact of sleep disturbances and anxiety on the quality of care provided by respiratory therapists to patients.

### **Limitations**

It is important to acknowledge some limitations of this study. Firstly, the study was conducted using a self-reported questionnaire, which may be subject to response bias and may not accurately reflect the true prevalence of sleep disturbances and anxiety among respiratory therapists in Saudi Arabia. Secondly, the sample size was relatively small and may not be

representative of the entire population of respiratory therapists in Saudi Arabia. Finally, this study was conducted during the COVID-19 winter of 2022, which may have had an impact on the results and may not be generalizable to other time periods or other healthcare settings.

## **Conclusion**

This study is the first study that assessed sleep disturbances and anxiety levels among respiratory therapists in Saudi Arabia. This study provides important insights into the prevalence of sleep disturbances and anxiety among respiratory therapists in Saudi Arabia during the COVID-19 winter of 2022. It is found that a significant proportion of respiratory therapists in Saudi Arabia experienced sleep disturbances. However, anxiety was not considered a major concern among most respiratory therapists, with only a small proportion having mild-to-moderate anxiety. The findings of this study have important implications for future research in the field of respiratory therapy, particularly in the context of sleep disturbances and anxiety levels. Further research is needed to explore effective strategies to support mental health and quality of sleep among respiratory therapists.

**Appendix A: Pittsburgh Sleep Quality Index (PSQI) and Zung Self-Rating  
Anxiety Scale (SAS) Survey.**



## **I. Demographics**

- Hospital type:
  - Government
  - Private
  
- Region:
  - South region
  - North region
  - Middle region
  - East region
  - West region
  
- Gender:
  - Male
  - Female
  
- Years of experience:
  - 1-2 years.  2-5 years.  5-10 years.  More than 10 years.
  
- Qualification:
  - Diploma
  - Bachelor
  - Masters
  - Ph.D.
  
- Have you dealing with Covid-19 patients:
  - Yes
  - No

## II. THE PITTSBURGH SLEEP QUALITY INDEX (PSQI)

Instructions: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions. During the past month,

1. When have you usually gone to bed? \_\_\_\_\_
2. How long (in minutes) has it taken you to fall asleep each night? \_\_\_\_\_
3. When have you usually gotten up in the morning? \_\_\_\_\_
4. How many hours of actual sleep do you get at night? (This may be different than the number of hours you spend in bed) \_\_\_\_\_

5. During the past month, how often have you had trouble sleeping because you...	Not during the past month (0)	Less than once a week (1)	Once or twice a week (2)	Three or more times week (3)
a. Cannot get to sleep within 30 minutes				
b. Wake up in the middle of the night or early morning				
c. Have to get up to use the bathroom				
d. Cannot breathe comfortably				
e. Cough or snore loudly				
f. Feel too cold				
g. Feel too hot				
h. Have bad dreams				
i. Have pain				
j. Other reason(s), please describe, including how often you have had trouble sleeping because of this reason(s): _____				
6. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
8. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?				
	Very good (0)	Fairly good (1)	Fairly bad (2)	Very bad (3)
9. During the past month, how would you rate your sleep quality overall?				

Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. *Psychiatry Research*, 28(2), 193–213.

### III. Zung Self-Rating Anxiety Scale (SAS)

For each item below, please place a check mark (✓) in the column which best describes how often you felt or behaved this way during the past several days.

Place check mark (✓) in correct column.	A little of the time	Some of the time	Good part of the time	Most of the time
1 I feel more nervous and anxious than usual.				
2 I feel afraid for no reason at all.				
3 I get upset easily or feel panicky.				
4 I feel like I'm falling apart and going to pieces.				
5 I feel that everything is all right and nothing bad will happen.				
6 My arms and legs shake and tremble.				
7 I am bothered by headaches neck and back pain.				
8 I feel weak and get tired easily.				
9 I feel calm and can sit still easily.				
10 I can feel my heart beating fast.				
11 I am bothered by dizzy spells.				
12 I have fainting spells or feel like it.				
13 I can breathe in and out easily.				
14 I get feelings of numbness and tingling in my fingers & toes.				
15 I am bothered by stomach aches or indigestion.				
16 I have to empty my bladder often.				
17 My hands are usually dry and warm.				
18 My face gets hot and blushes.				
19 I fall asleep easily and get a good night's rest.				
20 I have nightmares.				

Zung, W. W. K. (1971). A rating instrument for anxiety disorders. *Psychosomatics*, 12(6), 371–379.

**Thanks for agreeing to take part in this survey.**

**If you have any questions or suggestions about this survey, please write them down in the feedback section or through the contact information below:**

- **Feedback:**

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**Contact information:**

- **Asim Madkhali: [amadkhali3@student.gsu.edu](mailto:amadkhali3@student.gsu.edu) Phone: +966596997298.  
Research advisor Dr. Kyle Brandenberger: [kbrandenberger1@gsu.edu](mailto:kbrandenberger1@gsu.edu)**

## **Appendix B: Cover Letter**

**Dear Respiratory Therapist,**

You are invited to a research study because you are taken part in a clinical setting as a registered respiratory therapist. This study aims to evaluate the prevalence of sleep disturbance and anxiety among Saudi respiratory therapists (RTs) during the COVID-19 pandemic. Also, this study will show the prevalence of sleep disturbance and anxiety in different regions of Saudi Arabia.

Asim Madkhali is conducting this research study as part of the requirements for the master's degree in respiratory therapy from the Department of Respiratory Therapy at Georgia State University under the guidance of Dr. Kyle Brandenberger, Assistant Professor.

Although there will be no direct benefit to you from participating in this study, the information gathered will improve healthcare quality for respiratory care services. If you choose to participate, you will be required to complete the following survey, which should take **no more than 10 minutes**.

Your participation is entirely voluntary, and you may refuse or discontinue taking the survey at any time without penalty or loss of benefits to which you are otherwise entitled. Please note that your responses are used exclusively and entirely confidential for research purposes. To protect your privacy, no names or codes will be used to identify you or your survey. Your completion and submission of the survey constitute your agreement to take part in the study.

We look forward to the completion of your survey. However, you may withhold at any time by not completing or sending a blank survey if you decide not to participate in this study. The information from this study may be published in journals and presented at professional meetings. This study does not cost the participant in any way, except for the time spent completing the survey.

If you have any questions about this research, now or in the future, don't hesitate to contact Asim Madkhali at [amadkhali3@student.gsu.edu](mailto:amadkhali3@student.gsu.edu) or Dr. Kyle Brandenberger at [kbrandenberger1@gsu.edu](mailto:kbrandenberger1@gsu.edu). The department's mailing address can be found at the bottom of this page. You may also contact the Georgia State University IRB at <https://gsu.imedris.net/>.

Your completion and submission of the survey imply that you agree to participate in this research. Please note that you may withdraw at any time by not completing or by clicking the disagree button.

Please note: If you agree to participate in this research, please continue with the survey.  
 I Agree       I Disagree

Sincerely,  
Asim Madkhali  
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Georgia State University  
P.O. Box 4019  
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(404) 413-1225

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