Burnout Syndrome Prevalence Rate and Its Related Factors among Critical Care Nurses During Covid-19 Pandemic

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Abstract

Background: The COVID-19 pandemic has presented unprecedented challenges for healthcare professionals worldwide, especially those working in critical care settings. Moreover, the high prevalence rate of burnout syndrome among critical care nurses during the pandemic. Also, identifying potential risk factors, and the impact of burnout on nurses' well-being and job performance. **Aim**: This study aimed to assess burnout syndrome prevalence rate and its related factors among critical care nurses during covid-19 pandemic. **Design**: A descriptive exploratory research design was utilized in this study. **Setting**: the current study was carried out at critical care units at Qaha hospital for quarantine which affiliated to Ministry of Health, Qalyubia governorate, Egypt. **Subjects**: All the available male and female nurses working at the previous mentioned setting was included in the study. **Data collection tools**: Data was collected using two tools: Maslash Burnout Inventory (MBI) Assessment tool and Nurses' burnout related factors assessment tool. **Results**: The present study revealed that, 45.7% of studied nurses were aged between 30<50 years with mean ±SD age 35.85± 6.29, regarding their gender 68.6% of them were females, 57.1% of them had unsatisfactory level of knowledge regarding COVID-19, 57.1% of studied nurses had a high degree of burnout regarding job stress scale, 37.1% of studied nurses had a low degree of total work-related burnout and 42.9% of them had a low burnout regarding their total client-related burnout. As regard correlation between different variables the current study revealed that there was a statistically significant correlation between total score of knowledge, attitude, work-related burnout, client-related burnout, and burnout inventory among critical care nurses during covid-19 pandemic. **Conclusion**: more than a half of studied nurses had a high degree of burnout, more than one third of studied nurses had a low degree of total work-related burnout, and nearly half of them had a low burnout. **Recommendations**: Conduct studies to track the prevalence of burnout among nurses over time and assess the impact of interventions and organizational changes on burnout rates.

Key words: Burnout Syndrome, COVID-19 pandemic, Prevalence rate.

Introduction:

The COVID-19 pandemic has presented unprecedented challenges for healthcare professionals worldwide, especially those working in critical care settings. Critical care nurses, in particular, have been at the forefront of the response, tirelessly caring for severely ill COVID-19 patients. However, the relentless demands and stressors of the pandemic have raised concerns about the prevalence of burnout among frontline healthcare providers **(Shanafelt et al., 2020).**

Burnout syndrome is a state of emotional, physical, and mental exhaustion resulting from prolonged exposure to work-related stressors. It can have detrimental effects on nurses' well-being, job satisfaction, and the quality of patient care they provide. Given the unique and demanding nature of their work during the pandemic, critical care nurses may be particularly vulnerable to experiencing burnout **(Wu et al., 2020).**

Factors affecting nurse's burnout syndrome include personal burnout, work-related burnout, and client-related burnout; personal factors are identified in demographic features (age, gender, marital status), social support, adaptive capabilities. Work-related factors include working stress and attitude, exposition to stressful experiences, salary, and availability of personal protective equipment (PPE). Client related factors as hard to deal with client, drain your energy and frustration to work with the client **(Chen et al., 2021).**

Work-related burnout factors experienced by critical care nurses. Burnout can arise from various work-related stressors, such as long working hours, high patient acuity, and inadequate resources. Understanding the specific work-related factors contributing to burnout will allow healthcare organizations to implement targeted interventions to alleviate these stressors and create a supportive work environment for critical care nurses **(Wu et al., 2020).**

It's very crucial to assess the prevalence of burnout among critical care nurses during the COVID-19 pandemic, identify potential risk factors, and explore the impact of burnout on nurses' well-being and job performance. It will contribute to a better understanding of the challenges faced by critical care nurses during these unprecedented times and inform the development of targeted interventions to support their mental and emotional well-being **(Ma et al., 2021).**

Nurses play an instrumental role in the health systems response to COVID-19 pandemic since they are the frontline health care workers directly involved in the treatment and care of patients. Nurses are under extreme and persistent psychological pressure since they are particularly exposed to the threat of COVID-19 infection, and they become overwhelmed by fear for the safety of their own health, their close family members, and their patients. Under these circumstances nurses experience severe psychological and mental problems that could lead to burnout **(Galanis et al., 2021).**

Significance of the study:

The time from exposure to onset of symptoms is classically around five days, but may range from two days to two weeks. As of the evening of May13, 2020, there were 10.431 affirmed cases of covid-19 and 556 deaths in Egypt. The 2020 coronavirus widespread in Egypt is a portion of a continuous around the world coronavirus widespread. The primary case of covid-19 in Egypt was affirmed on14 February 2020 .In Egypt, from 3 January 2020 to 11 October 2021, there have been 312, 413 confirmed cases of COVID-19 with 17,695 deaths (Ministry of Health and Population Egypt [MOHP], 2020, 2021).

A global meta-analysis review reported that 11.23% of nurses have experienced burnout (Woo et al., 2020). A study on health care workers (HCWs) who cared for patients with COVID-19 found that over half of the sample had high levels of burnout **(Jalili et al., 2020).**

Similarly, another study found that, during coronavirus pandemics, the average level of burnout among medical residents was higher than that of non-pandemic periods **(Dimitriu et al., 2020).**

As, burnout in health care workers (HCWs) is mainly factorial and has been shown to cause detrimental effect which can lead to feelings of dread about work, mental and physical exhaustion, insomnia, depression and physical distress.

So, Job burnout not only puts the individual's health and wellbeing at risk, but also is associated with the frequency of medical errors and quality of the healthcare services. Therefore, it is very important to identify the factors contributing to burnout among the nurses.

Aim of the study:

The present study aimed to assess burnout syndrome prevalence rate and its related factors among critical care nurses during covid-19 pandemic through the followings:

1.Assessment of prevalence rate and degree of burnout syndrome among critical care nurses during covid-19 pandemic.

2.Assessment of burnout syndrome related factors among critical care nurses during covid-19 pandemic.

Research Question

This study was conducted to answer the following questions:

1.What are the prevalence rate and degree of burnout syndrome among critical care nurses during covid-19 pandemic?

2.What are burnout syndrome related factors among critical care nurses during covid-19 pandemic?

Subjects and methods:

I-Technical Design:

The technical design included research design, setting, subjects and tools of data collection used in this study.

Research Design:

A descriptive exploratory research design was utilized in this study.

A convenient sample of all available male and female nurses working at the previous mentioned setting was included in the study (35 nurses).

A- Study Setting:

-The study was conducted in the critical care units which located in in 3rd and 4th floor and included 20 beds distributed in 5 rooms at Qaha hospital for quarantine which affiliated to Ministry Of Health, Qalyubia governorate, Egypt.

-The researcher selected this setting because it was chosen for quarantine during the periods of COVID-19.

Subject:

All the available male and female nurses working at the previous mentioned setting was included in the study (35 nurse).

Tools of Data Collection:

Data was collected using the following tools:

Tool I: Maslash Burnout Inventory (MBI) Assessment Tool:

It was used to assess nurses' burnout prevalence and its level at critical care units .It was adopted from **(Maslash et al., 2018)**. It's valid and reliable tool (alpha Cronbach test n= 1.3141). The MBI contains 22 statements and was designed to assess the three components of the burnout syndrome which are (occupational exhaustion, depersonalization and reduced personal accomplishment). It was translated into Arabic language, and back translation was done.

Scoring system:

The items that was summed to create the subscales are 7-point Likert- type items which range from 0 to 6, where a response means as follows (0 = Never, 1 = At least a few times a year, 2 = At least once a month, 3 = Several times a month, 4 = Once a week, 5 = Several times a week, 6 = Every day), each score could then be coded as low, average or high by using numerical cutoff points listed on the scoring key.

Total items 22 and total score was from 0-132 grades, it was categorized as follows:

- Low degree of Burnout (<50)
- Moderate degree of Burnout(50-80)
- High degree of Burnout (>80)

Tool II: Nurses' burnout related factors assessment tool:

It was adapted from Copenhagen burnout inventory (CBI) **(Kristensen et al., 2005).** CBI is a reliable and valid tool (Cronbach's alpha test was 0.953 (95.3%) for the CBI), It was modified by the researcher based on related literatures **(Kontis et al., 2020; Martinez-Lopez et al., 2020; Guseva et al., 2020; Bridgeman et al., 2018; Sarboozi et al., 2020).**

It was written in Arabic language to assess factors related to nurses' burnout during covid-19 pandemic in the intensive care units (ICU). It was divided into three parts:

- **Part I: Personal burnout related factors**
- **Part II: Work-related burnout**
- **Part III: Client-related burnout**

Part I: Personal burnout related factors: It was sub-divided into four sections**:**

Section I: Socio-Demographic characteristics: it was used to assess nurses' (age, gender, marital status, educational level, work experience, number of family members, monthly income).

Section II: Nurses 'history of illness and social related factors:

It was used to assess nurses 'history of illness as (chronic disease, history of exposure with corona virus, history of hospitalization), also social related factors as (support from family and friends, fear of covid-19 infection, family member suffers from complications, death of a family member due to infection with the corona virus, if its burden to the family because of the nature of your work, availability of personal protective equipment at the workplace).

Section III: it was used to assess nurses' Knowledge regarding the following five dimensions about (Nature of the disease and its clinical presentation, transmission routes of the disease, prevention and control of Covid-19, diagnosis of the disease, and treatment of the disease).

Scoring system:

The scoring system was designed as a multiple choice questions and included 14 items, each correct answer was given (one) grade and incorrect answer was given (zero).

Score % = (the observed score / the maximum score) × 100

The total level of nurses' knowledge ranged from 0-14 grades, A satisfactory level of knowledge was defined when the percentage of correct answers related to knowledge questions reaches more than 75% of the respondents according to **(Saadeh et al., 2021)**. It was categorized as follows:

- Satisfied ≥ 75% [Score 10-14] indicated high level of knowledge.
- Unsatisfied < 75% [Score 0-10] indicated low level of knowledge.

Part II: work-related burnout:

Job stress scale:

-It was used to assess job stress scale, role expectation conflict, coworker support and work-life balance. It was adopted from **(Shukla& Srivastava, 2016).**

-Also, it was used to assess Leadership empowering behavior during the COVID-19 pandemic that was adapted from **(Gyekye, 2023).**

-This scale totally included 36 items. It was translated to Arabic language and the back translation was done, and its validity and reliability were done.

Scoring system:

Responses to these items are rated on Five-point response Likert scales as follows: (1 = strongly disagree, 2= disagree , 3= undecided, 4= agree, 5 = strongly agree).

The total score ranged from 8-40 grades and was categorized as follows:

- Low Burnout (<73)
- Moderate Burnout (73-126)
- High Burnout (>126)

Part III: clients-related burnout assessment tool:

It was used to assess clients- related burnout factors such as (Do you find it hard to work with patients?, Do you sometimes wonder how long you will be able to continue working with patients?, Do you waste your energy working with patients, Do you find it frustrating to work with patients?.

Scoring system:

The scoring system had a five-point response Likert scale as follows;

(1 = Always or to a very high degree, 2= Often or to a high degree, 3 =Sometimes or somewhat, 4 =Seldom or to a low degree, 5 = Never/ almost never or to a very low degree) point for each item.

The total score ranged from 7-35 grades and was categorized as follows:

- Low Burnout (<15)
- Moderate Burnout (15-25)
- High Burnout (>25)

II-Operational design:

It included preparatory phase, tools validity and reliability, pilot study and field work.

Pilot study:

A pilot study was carried out on 10 % of study subjects (5 nurses) to test clarity, feasibility and applicability of the data collection tools. The subjects who were included in the pilot study were included in the study subject because no modification was done after conducting the pilot study.

Ethical Consideration:

- Approval to conduct the study was obtained from the ethical and scientific research committee in the faculty of nursing, at Ain Shams University before starting the study.
- The researcher introduced herself for the study subjects and explained and clarified the study aim to the subjects.
- The researcher assured maintaining anonymity and confidentiality of subjects' data included in the study.
- The nurses were informed about their rights to withdrawal from the study at any time without giving any reason.
- The researcher obtained oral consent from study subjects to participate in the study.

Field work:

- An informed consent was obtained from each nurse prior to the data collection after explaining the aim of the study.
- Data collection started and completed within two months from beginning of April (2023) until the end of may (2023).

Data collection was done by the researcher at the previously mentioned setting two days per week (Monday and Wednesday) in the morning shift. Each form took about 30 minutes to be filled from each nurse.

Results

Table (1) shows that the mean ±SD of age groups for the studied nurses were35.85±6.29, regarding marital status 60.0% of them were married, concerning family members the same table also indicates that 54.3% of nurses had from 3 to 4 members. In relation to the monthly income the same table also shows that 80% of nurses reported that it is not sufficient. Regarding experience in caring for covid-19 infection 77.1%of studied nurses had an experience in caring for covid-19 infection**.**

Table (2) shows that 57.1 of studied nurses had a high degree of burnout regarding occupational exhaustion, 37.1% of them had a high degree of burnout regarding depersonalization, 40%of them had a high degree of burnout regarding Personal accomplishment assessment. While 45.7% of studied nurses had a high degree of burnout syndrome prevalence rate.

Table (3) reveals that 57.1 of studied nurs es had a high degree of burnout regarding Job stre ss scale. Additionally that, 40.0% of them had a low degree of burnout regarding role expectation conflict, 45.7% of them had a low degree of burn out regarding coworker support, 42.9% of them had a low degree of burnout regarding work-life b alance. Finally, 37.1% of them had a moderate d egree of burnout regarding Leadership empowerin g behavior during the COVID-19 pandemic.

$R=0.572$; $R^2=0.441$

Model ANOVA: F=5.386, p-value <0.001

a Predictors: (Constant), Age (years),

Age (years), Gender, Marital status, Number of dependents/ family member, Work experience, Level of education, Monthly income for nurses, Experience in caring for covid-19 infection, Knowledge, Attitude, Work-related burnout, Client-related burnout, Work-related burnout and Client related burnout

b Dependent Variable: Burnout inventory

Table (4) shows that there was a statistically significant positive correlation between age, work experience, level of education, experience in caring for covid-19 infection, knowledge, attitude, work-related burnout, client-related burnout, work-related burnout and client related burnout and burnout inventory, revealing that the forementioned factors are good predictors for burnout inventory.

Table (1): Number and percentage distribution of socio-personal data among nurses under study (n=35).

Variable	No.	%
Age (years)		
Mean±SD	35.85±6.29	
Marital status:		
Single	12	34.3
Married	21	60.0
Divorced	1	2.9
Widowed	1	2.9
Number of dependents/ family member:		
1-2 member	7	20.0
3-4 member	19	54.3
>5 member	9	25.7
Monthly income for nurses		
Sufficient	7	20.0
Insufficient	28	80.0
Experience in caring for covid-19 infection		
Yes	27	77.1
No	8	22.9

Table (2): Number and percentage distribution of the studied nurses regarding total Maslash Burnout inventory (n =35).

Level of burnout inventory	Low degree of Burnout		Moderate degree of Burnout		High degree of Burnout	
	No.	%	No.	%	No.	%
Occupational exhaustion (EE)	7	20.0	8	22.9	20	57.1
Depersonalization / loss of Empathy (DP)	12	34.3	10	28.6	13	37.1
Personal accomplishment assessment (PA)	11	31.4	10	28.6	14	40.0
Burnout Syndrome Prevalence Rate	10	28.6	9	25.7	16	45.7

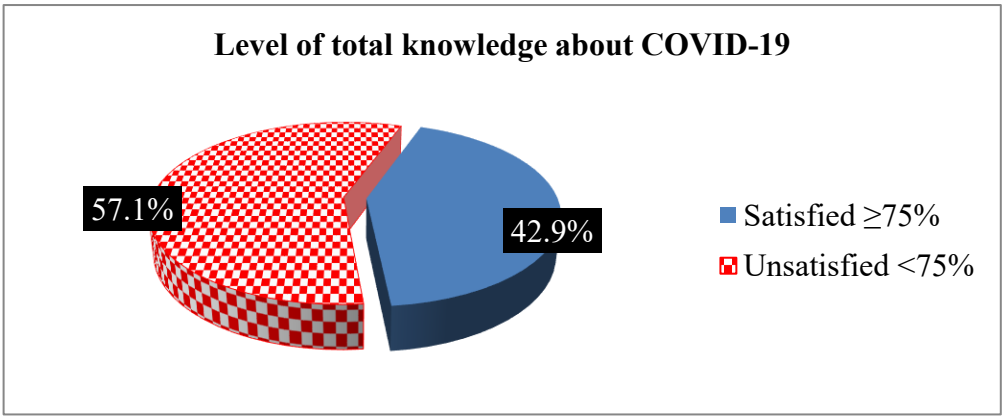

Figure (1): reveals that, 57.1% of studied nurses had total unsatisfied level of

Table (3): Number and percentage distribution of the studied nurses regarding their total work-related burnout (n =35).

Domain	Low Burnout		Moderate Burnout		High Burnout	
	No.	%	No.	%	No.	%
Job stress scale	8	22.9	7	20.0	20	57.1
Role expectation conflict	14	40.0	9	25.7	12	34.3
Coworker support	16	45.7	11	31.4	8	22.9
Work-life balance	15	42.9	8	22.9	12	34.3
Leadership empowering behavior during the COVID-19 pandemic.	12	34.3	13	37.1	10	28.6
Total work-related burnout	13	37.1	10	28.6	12	34.3

Figure (2): Percentage distribution of the studied nurses regarding their work-related burnout.

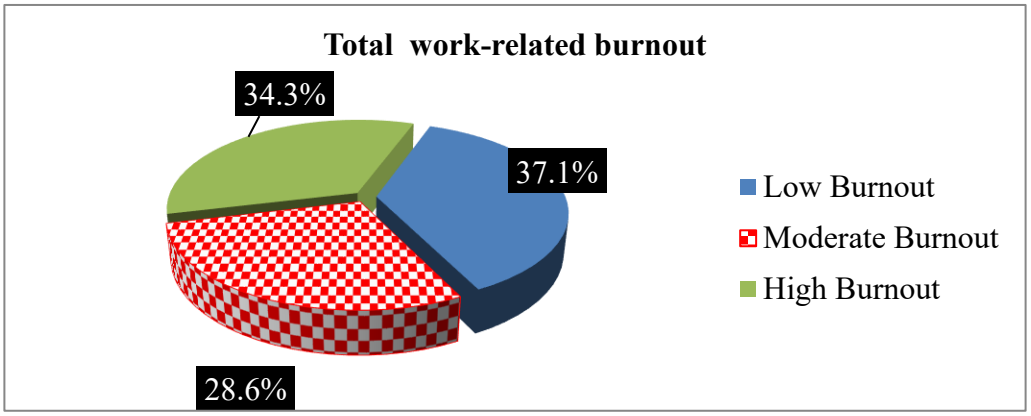

Figure (2): represents that 37.1% of studied nurses had a low degree of total work-related burnout.

Table (4): Best fitting multiple linear regression models for predictors of high degree of burnout by factors and demographic characteristics.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	β	Std. Error	Beta		
Age (years)	1.684	0.925	0.706	3.138	0.018*
Gender	0.100	0.082	0.115	1.020	0.176
Marital status	0.099	0.220	0.067	0.727	0.345
Number of dependents/ family member	0.086	0.080	0.102	0.976	0.257
Work experience	0.836	0.302	0.461	2.767	0.028*
Level of education	4.276	1.213	0.000	6.153	<0.001**
Monthly income for nurses	0.161	0.131	0.184	1.295	0.115
Experience in caring for covid-19 infection	1.194	0.778	0.857	2.332	0.038*
Knowledge	0.875	0.571	0.628	2.857	0.028*
Attitude	2.297	1.262	0.963	4.182	<0.001**
Work-related burnout	1.140	0.412	0.630	3.332	0.016*
Client-related burnout	1.026	0.391	0.194	4.917	<0.001**

Discussion

Nurses are very often susceptible to job burnout, with the highest levels of job burnout reported among nurses working in an environment where nurses are exposed to an overwhelming amount of job-related stress. Known factors contributing to the high risk of job burnout, inappropriate job conditions and lack of time to adequately address the patient's needs. Accordingly, the relevant nurses experience stress levels beyond their capacities, which may lead to job burnout. Work-related burnout and client-related burnout, personal factors are identified in demographic features, social support, adaptive capabilities. Client related factors as hard to deal with client, drain your energy and frustration to work with the client **(Ma et al., 2021; Chen et al., 2021).**

Coronavirus is a communicable disease that originates from a large family of viruses that causes the diseases. It is also complicated by the fact that patients may have irregular symptoms. This means COVID-19 exhibits clinical presentations ranging from asymptomatic to acute respiratory distress syndrome and multiple-organ failure that leading to death. In addition, COVID-19 also is transmitted from person to person through respiratory droplets **(Gebremeskel et al., 2021).**

The aim of the present study was carried out to assess burnout syndrome prevalence rate and its related factors among critical care nurses during covid-19 pandemic. The discussion of the findings covered the main parts. demographic data of the studied nurses, prevalence rate and degree of burnout syndrome, nurses' knowledge regarding covid-19, related factors among critical care nurses, and the correlation between different variables.

Regarding to nurses' demographic data, the present study result revealed that near a half of nurses were aged between (30-<50) years with mean age (35.85), and more than two thirds of them were females, this result could be due to nursing profession in Egypt has more approaching from females than males. This finding is in the same line with **Jose et al. (2020),** in a study entitled "Burnout and Resilience among Frontline Nurses during COVID-19 Pandemic" which revealed that the majority of nurses age ranged from 23 to 45 years with a mean age of 29 and 73.3% of them were females.

Related to work experience the current study revealed that (42.9%) of nurses had more than ten years of experience, this result is consistent with a study done by **Jamebozorgi et al., (2022)** entitled "Nurses burnout, resilience, and its association with socio-demographic factors during COVID-19 pandemic" reported that more than two thirds of his study sample (69.8%) had more than ten years of experience.

Regarding education level, the current study revealed that near a half of studied nurses (42.9%) graduated from technical institute of nursing, on the same line **Zareei, et al., (2022)** in a study entitled "Job burnout among nurses during COVID-19 pandemic" which revealed

that (90%) of his studied nurses had a higher degree of nursing studies.

These differences in demographic data may be due to the disparities between different population with geographical and social determinants and the other characteristics they could possess the same such as insufficient income may be because of the global economic issues all over the world.

In relation to burnout inventory of the studied nurses the current study revealed that more than a half of studied nurses (57.1) had a high degree of burnout according to occupational exhaustion, more than one third (37.1%) had a high degree of burnout according to depersonalization, near a half (40%) of them had a high degree of burnout according to Personal accomplishment assessment, While nearly half of studied nurses (45.7%) had a high degree of burnout syndrome prevalence rate.

This result is in agreement with a study done by **Adeniji et al., (2019)** in a study entitled "Burnout Among Nurses in a Nigerian General Hospital" which revealed that a high prevalence of burnout among the participants, with almost half of them experiencing high burnout levels in different dimensions occupational exhaustion, depersonalization, and personal accomplishment assessment.

On the same line **Zhang et al., (2021)** in a study entitled "Prevalence and Associated Factors of Burnout Among Frontline Primary Health Care Providers in China During the COVID-19 Pandemic" justified that nearly half (45.7%) of the studied nurses had a high degree of burnout syndrome prevalence rate. However, specific burnout prevalence rates for occupational exhaustion, depersonalization, and personal accomplishment were also mentioned: 57.1% had high burnout levels in occupational exhaustion, 37.1% in depersonalization, and 40% in personal accomplishment.

As regard nurses' knowledge about COVID-19 the current study revealed that (85.7%) of studied nurses had unsatisfied knowledge about transmission routes of the disease, (71.4%) of studied nurses had unsatisfied knowledge about nature of the disease and its clinical presentation. While (60.0%), (54.3%) had satisfied knowledge about diagnosis of the disease and Prevention and control of the disease respectively. According to total knowledge of studied nurses (57.1%) had unsatisfied knowledge about the disease. It may be due to the fact that covid-19 pandemic is a relatively recent disease and there is still ongoing researches to discover more details about it, how to confront and control. Nurses need to be updated with new knowledge and data about the pandemic and training to be designed to improve their information.

On the same line **El-Monshed et al., (2021)** in a study entitled "Nurses' knowledge, concerns, perceived impact and preparedness toward COVID-19 pandemic", which reported that (66.9%) had knowledge defects about the covid-19 in different aspects work-related concerns, perceived impact, transmission routes, diagnosis of the disease and prevention and control.

On the other hand, **Nashwan et al., (2021)** in a study entitled "Nurses' willingness to work with COVID-19 patients", which revealed that (50.2%) of studied nurses had a satisfied level of knowledge regarding covid-19.

Regarding work-related burnout factors the current study revealed that more than a half of studied nurses (57.1) had a high degree job stress scale, near a half (40.0%) had a low degree of role expectation conflict, near a half (45.7%) of them had a low degree of coworker support, near a half (42.9%) of them had a low degree of work-life balance, more than one third (37.1%) of them had a moderate degree of leadership empowering behavior during the COVID-19 pandemic. As regards total work-related burnout factors, more than one third of studied nurses (37.1%) had a low degree of total work-related burnout.

On the same line **Lee et al. (2021)** in a study entitled "Impact of COVID-19 on Nurses' Well-being and Work-Related Burnout.", who's results, showed that nurses faced heightened job stress due to increased workload and exposure to COVID-19 patients. The study also found low levels of role expectation conflict and coworker support, contributing to burnout risk.

Also, this result is in agreement with a study done by **Ramirez et al. (2020)** in a study entitled "COVID-19 Impact on Nurses' Work Environment", which indicated that nurses reported low levels of coworker support and work-life balance, which were associated with increased burnout and emotional exhaustion.

On the other side **Kim et al. (2020)** in a study entitled "Impact of COVID-19 on the

Work-Life Balance of Nurses in South Korea", which revealed that a substantial number of nurses experienced a high degree of work-life balance due to suitable working hours and high job demands, leading to decreasing burnout risk.

This varying in nurses experiencing different levels of burnout factors may be due to that it reflects the complex interplay of individual experiences, organizational contexts, and the unique challenges posed by the COVID-19 pandemic. These findings underscore the need for targeted interventions and support strategies to address the specific burnout factors that nurses are facing. The consistency of these findings across multiple studies adds weight to their significance and implications for nursing well-being and support strategies.

As regard correlation between different variables the current study revealed that there was a statistically significant correlation between total score of knowledge, attitude, work-related burnout, client-related burnout, work-related burnout, client related burnout and burnout inventory among critical care nurses during covid-19 pandemic. On the same line **Lee et al. (2021)** in a study entitled "Association between Nurses' Knowledge, Attitudes, and Burnout during the COVID-19 Pandemic", which revealed significant correlations between nurses' knowledge levels, attitudes towards the pandemic, and their experiences of burnout. Nurses with higher levels of knowledge and positive attitudes tended to experience lower burnout.

Also, this result is supported by a study done by **Rahman et al. (2020)** in a study entitled "Impact of COVID-19 Pandemic on Nurses' Burnout, Job Satisfaction, and Turnover Intention", which showed significant correlations between burnout levels, job satisfaction, and the likelihood of nurses considering leaving their jobs. Higher burnout was associated with lower job satisfaction and increased turnover intention.

As regard predictors of high degree of burnout by factors and demographic characteristics the current study showed that there was a statistically significant correlation between age, work experience, level of education, experience in caring for covid-19 infection, knowledge, attitude, work-related burnout, client-related burnout, work-related burnout and client related burnout and burnout inventory, revealing that the forementioned factors are good predictors for burnout inventory.

This result is in agreement with **Arslan et al. (2020)** in a study entitled "Burnout in Health Care Workers during COVID-19 Pandemic: The Effects of Workload and Social Support". The findings revealed that high workload and inadequate social support were significant predictors of burnout among nurses and other healthcare professionals.

From the investigator point of view the importance of recognizing and addressing specific stressors that contribute to burnout among healthcare workers during the COVID-19 pandemic. Factors such as workload, social support, and support from hospital management play a significant role in predicting burnout levels. By addressing these factors and implementing supportive interventions, healthcare organizations can foster a healthier work environment and enhance the well-being of their frontline staff during challenging times.

Conclusion

Based on the findings of the current study, it can be concluded that:

On the light of the current study findings, it can be concluded that more than a half of studied nurses had a high degree of burnout, more than a half of them had unsatisfied knowledge regarding COVID-19. As regards total work-related burnout factors, more than one third of studied nurses had a low degree of total work-related burnout. Regarding total client-related burnout, nearly half of them had a low burnout. Additionally, As regard correlation between different variables the current study revealed that there was a statistically significant correlation between total score of knowledge, attitude, work-related burnout, client-related burnout, and burnout inventory among critical care nurses during covid-19 pandemic.

Recommendations:

Based on the current study findings the following are recommended in nursing practice, nursing education, and nursing research:

Nursing Practice:

- Implement well-being programs for nurses to address the factors contributing to burnout.

- Encourage peer support to foster a supportive and collaborative work environment where nurses can connect with and support each other.
- Provide nurses with flexible work schedules, when possible, to accommodate personal and family needs, thereby reducing the risk of burnout due to long working hours and high demands.
- Monitor nurse-patient ratios and workload, ensuring that nurses have the necessary resources and support to provide quality care without feeling overwhelmed.

Nursing Education:

- Stress management and resilience training to prepare future nurses for the demands of their profession and equip them with effective coping skills.
- Burnout awareness education about burnout, its symptoms, risk factors, and preventive measures. This will help raise awareness and empower students to recognize and address burnout early in their careers.

Nursing Research:

- Conduct studies to track the prevalence of burnout among nurses over time and assess the impact of interventions and organizational changes on burnout rates.
- Investigate cultural and contextual factors that contribute to burnout among nurses during crises, as different healthcare settings and regions may experience unique challenges.
- Examine the role of technology in nursing practice and its impact on burnout. Research should explore how technology can be optimized to reduce administrative burdens and support nurses in their daily tasks.
- Conduct comparative studies between different countries or regions to understand how healthcare systems and policies influence burnout rates among nurses during a pandemic.

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