

The Journal of

# Palembang Nursing Studies

Editor-in-Chief: Hidayat Arifin

*Volume 2 Number 2: May 2023*



# The Journal of Palembang Nursing Studies

## *Volume 2 Number 2: May 2023*

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# Impact of COVID-19 on mental health and quality of life among undergraduate nursing students and nurse internes

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## ABSTRACT

**Background:** COVID-19 pandemic had seriously impacted various aspects of all societies globally. The pandemic has the potential to affect all people including college students, with a large number of students experiencing psychological distress which became a growing universal concern.

**Objective:** The aim of this study was to examine the impact of COVID-19 on mental health and quality of life among undergraduate nursing students and nurse internes.

**Methods:** A cross-sectional research design was used, and data was collected from 264 participants using a demographic data sheet, the Patient Health Questionnaire-4, and the WHOQOL-BREF Scale. Data were analyzed using JMP Pro 15.

**Results:** The sample consisted mostly of nursing students (88.64%) from various academic levels, including 30% nurse interns. Among them, 34.85% had a history of COVID-19 symptoms, and 43.18% tested positive for COVID-19. Overall, participants reported high satisfaction with their quality of life, receiving necessary information for daily life, having improved relationships and support from friends and family compared to normal times, and having good access to healthcare services. Additionally, their faith and spiritual practices showed improvement. Regarding mental health, there was a significant correlation between perceived mental health and previous COVID-19 symptoms, while social support showed a significant correlation with quality of life.

**Conclusions:** Those nursing students and nurse interns who experienced negative psychological health impacts due to COVID-19 need to be referred for proper mental health counseling and other treatment services.

**Keywords:** nurse; COVID-19; mental health; quality of life

## INTRODUCTION

The COVID-19 pandemic has seriously impacted various aspects of the society on a global scale, that initiated fear of becoming ill, dying, helplessness, and stigma, it is critical to gain a better understanding of mental health status as soon as possible. SARS-CoV-2 is a virus that causes severe acute respiratory syndrome (SARS), was an incipient infection that lead to Coronavirus disease pandemic (COVID-19) in 2019,

## **Nursing and Healthcare Practices**

- *Nursing students and nurse interns were significantly affected by COVID-19, with a considerable percentage reporting COVID-19 symptoms and testing positive for the virus.*
- *Despite the pandemic challenges, participants reported being satisfied with their quality of life, healthcare services, and improved relationships with friends and family.*
- *The study emphasized the importance of providing mental health counseling and treatment services to nursing students and nurse interns affected by COVID-19's negative psychological health impacts.*

which spreads from individual to another via droplets. The Wuhan Municipal Health Commission affirmed a cluster of pneumonia cases on December 31, 2019, in Wuhan, Hubei Province. The presence of a new coronavirus was eventually discovered. Furthermore, the Ministry of Health confirmed the first case of coronavirus infection among people returning from Iran while passing through Bahrain on March 2, 2020 (Ministry of Health Saudi Arabia). Due to the virus's global spread affecting many countries, the World Health Organization (WHO) declared it a worldwide pandemic on March 11, 2020 (WHO, 2020). Governments began implementing strategies to control the rising infection and mortality rate after recognizing COVID-19 as a significant threat to the public's health and well-being. To contain the pandemic; quarantine, e-learning, social distancing, travel restrictions, and a variety of other measures were implemented. Individuals, including students, faced psychological burden as a result of the disruption in their requirements in education. Students were required to complete education responsibilities online, while postgraduate students who were interns had to temporarily halt their internships. As a result, numerous studies have found a link with both COVID-19 and mental disorders like depression and anxiety. However, little has been known about the influence of COVID-19 on nursing students' and interns' psychological

wellbeing and quality of life.

Mental health is a term that encompasses emotional, psychological, and social well-being, and it is thought to have an impact on how we think, feel, and act (WHO, 2018). During the COVID-19 epidemic, a systematic review of the prevalence of anxiety in the general population found that 27% of people had anxiety symptoms, with women and the elderly having the highest prevalence. Anxiety, depression, insomnia, and stress are common among healthcare workers, with 30–40% of the population suffering from these conditions (Vizheh et al., 2020) which is considered a public health issue. Mental health-related issues are even more complicated for undergraduate nursing students and nurse interns who want to become healthcare professionals in the future because such issues have a direct impact on their studies. Life satisfaction QoL, on the other hand, is an imprecise concept that varies from person to person and across various contexts; however, QoL can be defined as how individuals perceive themselves in their lives in the context of the culture and value system in which they live, as well as in relation to goals, expectations, standards, and concerns (WHO). NIs demonstrated high levels of resilience during the pandemic, a characteristic of effective QoL and a value that nursing schools should instill in their students (Chow et al., 2018). QoL encompasses a broad-ranging concept of an individual's state of life, health status, or life satisfaction.

People became fearful and began to have mental health issues as COVID-19 spread around the world (WHO, 2020). People stayed at home and avoided contact with others because of the fear of being infected with the virus. Almost all activities and work were halted. People in China, where the disease first spread, suffered from mental illness. "The COVID-19 outbreak in China has resulted in mental health issues among the general public in China and Japan, as well as medical personnel in Wuhan" (Ju et al., 2020). People became increasingly concerned as news of an influx of people infected with the Corona virus circulates through media. Many countries have conducted studies to determine the impact of the fear of getting infected with the disease on one's mental state (Gao et al., 2020) investigated the impact of social media exposure of this news on the mental health of citizens in Wuhan, China. The findings revealed the presence of mental health issues, which were positively associated



with frequent social media use during the COVID-19 outbreak. Furthermore, it was linked to depression, anxiety, and a combination of depression and anxiety.

While COVID-19 pandemic is still ongoing, (Zhang & Ma, 2020) conducted a study to determine the impact of the COVID-19 pandemic on mental health and quality of life among children up to 18 years in Liaoning Province, found that COVID-19 was associated with mild stressful impact among participants. While the majority of the participants did not feel helpless as a result of the pandemic, some were horrified and apprehensive. This conclusion can be elucidated by the fact that COVID-19 has less effect on the mental health of children and adolescents.

Research studies have been conducted to determine the impact of the infection spread on the public's psychological and mental health, particularly among those who interact with patients, such as physician, nursing staff, and other health care personnel (Serafini et al., 2020) conducted a review of approximately seven studies looked at the effect of the COVID-19 pandemic on the psychological health of the wider populace and others in contact with individuals affected. Findings revealed; Psychological symptoms such as depression, stress, mood alternations, and irritability. Subsequently, exacerbating responses to quarantine have also been identified, such as; fear, anger issues, anxiety, insomnia, confusion, grief, and numbness.

Among the university students, COVID-19 pandemic has been a tumultuous time. Pandemic had the potential to affect college students physically, financially, academically, and psychologically. With a large number of students experiencing psychological distress which became a growing concern (Al Shehri, 2015). In a study conducted by (Beisland et al., 2021) to compare the quality of life and fear of COVID-19 between urban Norwegian individuals and 2600 undergraduate nursing students at five universities, nursing students reported higher levels of fear of COVID-19. Moreover, fear of COVID-19 was more prevalent among first-year nursing students, students under the age of 25, students who have difficulty trusting institutions and the government to manage the COVID-19 crisis, students who reported feeling lonely as a result of COVID-19, and students who lacked clinical practice experience. In comparison to the reference population, undergraduate nursing

students had more psychological distress, which in turn affected the general quality of life during the Covid-19 epidemic.

Saudi nursing internship students were no different from the rest of the world's nursing students (Grande et al., 2021) of Hail University conducted a cross-sectional study to identify the quality of life of nursing interns in Saudi Arabia during the COVID-19 pandemic. Four domains were examined included psychological, physical, social, and environmental. They discovered that "the COVID-19 pandemic altered the working environment of NIs and other healthcare professionals in numerous ways." The psychological domain was deemed to be the most significant of the four, followed by their social relationship. Within the four domains, the environmental and physical domains received less attention."

The COVID-19 pandemic and resultant preventive services taken to combat it added substantial mental and emotional burdens to students' lives (Ghazawy et al., 2021). The existing literature on the impact of the COVID-19 epidemic on students in the United States emphasizes primarily on the role of medical and other health professions students during the current COVID-19 pandemic. Highlighted the growing concerns about the impact of COVID-19 on the mental health of vulnerable people and emphasized the imperative need for research to investigate the COVID-19 pandemic's mental health impact on college students and nurse interns (Vanaken et al., 2020).

The COVID-19 pandemic had a massive negative impact on people's daily lives. The fight against this deadly virus necessitates the participation of a large number of healthcare professionals, including nurse interns (NIs). Nurses and NIs experience stress, trauma, and mental health issues that affect their quality of life (QoL) as a result of being unprepared for a crisis of this magnitude that has never occurred in a century. As well ongoing outbreak of the pandemic could have a huge impact on the mental health of undergraduate nursing students. Limited data is available on how undergraduate nursing students and nurse interns in Saudi Arabia are coping with the COVID-19 pandemic and the extent of its ramifications on their mental health and quality of life. Thus, this study aims to examine the impact of the COVID-19 outbreak on the mental health and quality of life among undergraduate nursing students and nurse interns. The aim

**Table 1.** Sociodemographic characteristics of the study sample (n= 264).

| Variable                          | n   | %     |
|-----------------------------------|-----|-------|
| Gender                            |     |       |
| Female                            | 264 | 100   |
| Age                               |     |       |
| Mean 21.52                        |     |       |
| SD + 1.33                         |     |       |
| Marital Status                    |     |       |
| Single                            | 253 | 95.83 |
| Married                           | 11  | 4.17  |
| Divorced                          | 0   | 0.0   |
| Occupation                        |     |       |
| Full time student                 | 257 | 97.35 |
| Part time job                     | 4   | 1.52  |
| Full time job                     | 3   | 1.14  |
| Academic Level                    |     |       |
| Level 5                           | 48  | 18.18 |
| Level 6                           | 53  | 20.08 |
| Level 7                           | 64  | 24.24 |
| Level 8                           | 69  | 26.14 |
| Nurse Intern                      | 30  | 11.36 |
| Grade Point Average (GPA)         |     |       |
| Mean 3.41                         |     |       |
| SD + 0.68                         |     |       |
| Parents' Level of Education       |     |       |
| High school and below             | 127 | 48.11 |
| Graduate education                | 125 | 47.35 |
| Post graduate education and above | 12  | 4.55  |

of the study was to examine the impact of COVID-19 on mental health and quality of life among undergraduate nursing students and nurse internes.

## METHODS

### Design

A descriptive correlational cross-sectional design will be used in this study to examine the impact of COVID-19 on mental health and quality of life among undergraduate nursing students and nurse internes affiliated to colleges of nursing, King Saud Bin Abdulaziz University for Health Sciences at its three campuses on Riyadh, Jeddah and Alhasa, kingdom of Saudi Arabia.

### Participant and Settings

The study will be conducted virtually through web-based questionnaire survey, among nursing students and interns from the three nursing sister colleges affiliated to King Saud Bin Abdulaziz University for Health Sciences at its three campuses on Riyadh, Jeddah and Alhasa, kingdom of Saudi Arabia. The target population are nursing students and interns who will voluntarily give consent to participate in the study and complete the online questionnaire survey. A convenient sampling technique was utilized in the current study. The Sample size was calculated using Raosoft (2004) sample size calculator available at <http://www.raosoft.com/samplesize.html> using the following assumptions: Since the target population size is approximately 800 nursing students and internes with a confidence level of 95% so the



**Table 2.** History of exposure to COVID-19 (n = 264).

| Variable                                                        | n   | %     |
|-----------------------------------------------------------------|-----|-------|
| Do you have any previous history of COVID-19 symptoms?          |     |       |
| Yes                                                             | 92  | 34.85 |
| No                                                              | 172 | 65.15 |
| Have you ever tested positive to COVID-19?                      |     |       |
| Yes                                                             | 114 | 43.18 |
| No                                                              | 150 | 56.82 |
| Have you had any consultation with a specialist about COVID-19? |     |       |
| Yes                                                             | 65  | 21.21 |
| No                                                              | 208 | 78.79 |
| Do you have any physical illnesses?                             |     |       |
| Yes                                                             | 30  | 11.36 |
| No                                                              | 234 | 88.64 |

**Table 3.** Satisfaction with perceived family support among study participants (n = 264).

| Variable                                                     | n   | %     |
|--------------------------------------------------------------|-----|-------|
| From your perspective, do you receive enough family support? |     |       |
| Yes                                                          | 210 | 79.55 |
| No                                                           | 54  | 20.45 |
| How much are you satisfied with the support you receive?     |     |       |
| Extremely satisfied                                          | 75  | 28.41 |
| Very much satisfied                                          | 64  | 24.24 |
| Moderately satisfied                                         | 88  | 33.33 |
| Not at all satisfied                                         | 37  | 14.02 |

**Table 4.** Frequency distribution of mental health status items of undergraduate nursing students and nurse internes (n = 264).

| Problems                                                                                                | Not at all |       | Several days |       | More than half the days |       | Nearly everyday |       |
|---------------------------------------------------------------------------------------------------------|------------|-------|--------------|-------|-------------------------|-------|-----------------|-------|
|                                                                                                         | n          | %     | n            | %     | n                       | %     | n               | %     |
| Over the last 2 weeks, how often have you been bothered by feeling nervous, anxious or on edge?         | 33         | 12.50 | 111          | 42.05 | 59                      | 22.35 | 61              | 23.11 |
| Over the last 2 weeks, how often have you been bothered by not being able to stop or control worrying?  | 75         | 28.41 | 93           | 35.23 | 52                      | 19.70 | 44              | 16.67 |
| Over the last 2 weeks, how often have you been bothered by little interest or pleasure in doing things? | 58         | 21.97 | 81           | 30.68 | 68                      | 25.76 | 57              | 21.59 |
| Over the last 2 weeks, how often have you been bothered by feeling down, depressed, or hopeless?        | 74         | 28.03 | 82           | 31.06 | 57                      | 21.59 | 51              | 19.32 |

sample size is determined to be 260.

## Data Collection

Data were collected using the following interments:

### *Sociodemographic and health status*

#### *data*

Sociodemographic data sheet including participant's age, marital status, employment status, location of residence, academic level, accumulated GPA, COVID-19 history of infection, and testing results, having an immediate family member diagnosed with COVID-19, history of any physical health problems (hypertension, diabetes, arthritis, asthma etc.)

### *The Patient Health Questionnaire-4*

The Patient Health Questionnaire-4 (PHQ-4) is a 4-item inventory which was developed and validated by Kroenke et al. (2016) the scale is rated on a 4-point Likert-type scale. The purpose of the PHQ-4 is to allow for ultra-brief and accurate measurement of depression and anxiety. The scoring options range from "not at all" being the lowest, and "nearly every day" being the highest. The questions are drawn from the first two items of the Generalized Anxiety Disorder-7 scale (GAD-7) and the other two are derived from and the Patient Health Questionnaire-8 (PHQ-8). Kroenke et al. (2016) used Cronbach's alpha to assess the reliability of PHQ-4 which revealed a score of 0.81.

### *WHOQOL-BREF Scale*

To assess the effect of the COVID-19 pandemic on participants' quality of life, the 12 items modified from the WHOQOL scale will be utilized (Algahtani et al., 2021). The adapted version of the WHOQOL-BREF scale comprised of 12 items, with five-point ratings on each item ranging from 1 to 5; therefore, the lowest possible score was 12, and the highest possible score was 60 for the total scale. High scores indicating higher levels of QoL while low scores represent a lower QoL due to the negative effects of the COVID-19 pandemic. The modified version of the WHOQOL scale demonstrated good internal consistency (Cronbach's alpha = 0.81). This research's principal investigator has contacted the authors of the 12 items modified version the WHOQOL scale and granted permission to utilize the

scale for the purpose of the current research. The final questionnaire survey will be prepared on Google Forms and the survey link will be disseminated for online use by the projected participants (WHOQOL, 2020).

## Analysis Data

Data was coded for entry and was analyzed using JMP Pro 15 statistical software package. Descriptive statistics was used to describe sample characteristics such as age, campus location, academic level, history of COVID-19 infection, testing, mental health status and quality of life. Inferential statistics was used to assess correlations between different study variables.

## Ethical Considerations

Ethical permission to conduct this study was secured from Research Unit at King Saud Bin Abdulaziz University for Health Sciences-College of Nursing followed by the Institutional Review Board (IRB) approval from King Abdullah International Medical Research Center (KAIMRC). Informed consent was attained with a statement at the beginning of the online survey stating: "by completing this survey you gave your voluntary consent to participate in this study" after explaining the purpose of the study. Research ethics was followed strictly by the researcher. All individually identifiable information collected during this study was handled confidentially in accordance with KAIMRC protocols.

## RESULTS

Data were collected from College of Nursing affiliated to King Saud bin Abdulaziz University for Health Sciences, Riyadh with the aim to examine the impact of CONID-19 on mental health and quality of life among undergraduate Saudi nursing students and nurse interns in Kingdom of Saudi Arabia.

A total number of 264 Saudi adult nursing students and nurse interns affiliated to King Saud bin Abdelaziz University for Health Sciences (n = 234, 88.64%) nursing students from different levels and 30, 11.36% nurse interns completed the online self-reported questionnaire. Table 1 shows sociodemographic criteria of the study sample. The participants were from different academic levels and their age ranged between 18-26 years with a mean age of 21.52±1.33 year. The participants' minimum Grade Point Average (GPA) score was 2 and the maximum

**Table 5.** Frequency distribution of quality of life items of undergraduate nursing students and nurse internes (n = 264).

| Problems                                                                                                                          | Very Dissatisfied |       | Dissatisfied |       | Neutral |       | Satisfied |       | Very Satisfied |       |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------------|-------|--------------|-------|---------|-------|-----------|-------|----------------|-------|
|                                                                                                                                   | n                 | %     | n            | %     | n       | %     | n         | %     | n              | %     |
| How would you rate the impacts of COVID-19 pandemic on your quality of life?                                                      | 26                | 9.85  | 52           | 19.70 | 116     | 43.94 | 50        | 18.94 | 20             | 7.58  |
| How would you rate any direct or indirect impacts of COVID-19 pandemic on your general health?                                    | 19                | 7.20  | 47           | 17.80 | 94      | 35.61 | 70        | 26.52 | 34             | 12.88 |
| How would you rate the impacts of COVID-19 pandemic on your feelings of being safe in your daily life?                            | 31                | 11.74 | 41           | 15.53 | 65      | 24.62 | 64        | 24.24 | 63             | 23.86 |
| How would you rate the impacts of COVID-19 pandemic on your physical environment?                                                 | 32                | 12.12 | 77           | 29.17 | 81      | 30.68 | 52        | 19.70 | 22             | 8.33  |
| Keeping in view the impacts of COVID-19 pandemic, how available to you was the information that you needed in your daily life?    | 17                | 6.44  | 17           | 6.44  | 80      | 30.30 | 82        | 31.06 | 68             | 25.76 |
| How would you rate the impacts of COVID-19 pandemic in maintaining relationship with your friends?                                | 20                | 7.58  | 60           | 22.73 | 96      | 36.36 | 57        | 21.59 | 31             | 11.74 |
| How would you rate the impacts of COVID-19 pandemic in maintaining relationship with your family?                                 | 15                | 5.68  | 31           | 11.74 | 86      | 32.58 | 85        | 32.20 | 47             | 17.80 |
| Keeping in view the impacts of COVID-19 pandemic, 'how satisfied were you with the support you get from your family and friends?' | 16                | 6.06  | 34           | 12.88 | 92      | 34.85 | 75        | 28.41 | 47             | 17.80 |
| How would you rate the impacts of COVID-19 pandemic on your income?                                                               | 28                | 10.61 | 37           | 14.02 | 108     | 40.91 | 61        | 23.11 | 30             | 11.36 |
| How would you rate the impacts of COVID-19 pandemic on your access to health services?                                            | 14                | 5.30  | 30           | 11.36 | 90      | 34.09 | 74        | 28.03 | 56             | 21.21 |
| To what extent does faith give you comfort to deal with hard time of COVID-19 pandemic?                                           | 11                | 4.17  | 29           | 10.98 | 90      | 34.09 | 79        | 29.92 | 55             | 20.83 |
| How would you rate the impacts of COVID-19 pandemic on your spiritual practice?                                                   | 13                | 4.92  | 27           | 10.23 | 82      | 31.06 | 78        | 29.55 | 64             | 24.24 |

was 4.88 with a mean GPA score of 3.41+0.68. The vast majority of the participants were full time students only (97.35%, singles (95.83%) and living with their families. More than half of the participants' parents level of education was graduate education and above (52%) (Table 1).

Table 2 epitomize participants' history of exposure to COVID-19, as shown more than one third (34.85%) had history of COVID-19 symptoms while 43.18% were tested positive to COVID-19 and only 21.21% had consultation with a specialist about COVID-19. Of the participants 11.36% had experienced other physical illness like Asthma, diabetes, Sickle cell disease, anxiety, depression and Vitamin D deficiency.

Table 3 represent the participants' satisfaction with the received family support, more than three quarters of the study participants (79.55%) had received family support and from those participants more than half of them (52.65%) revealed that they were extremely /very much satisfied with the support they received while one third (33.33%) were moderately satisfied and only 14% were not at all satisfied with the family support they received.

To assess the mental health status of the participants, they were asked how often have each of them been bothered by each of the problems listed in the table 4 and the table illustrate the participants' responses. The total mental health score of the participants ranged between 0 and 12 with a mean mental health score of 5.60+3.58. Previous research has established that a score of 3 or greater on the Depression subscale represents a reasonable cut off point for identifying potential cases of depression. A score of 3 or more is positive and should be further evaluated by PHQ-9 or a mental health referral should be made. Likewise, a score of 3 or greater on the Anxiety subscale represents a reasonable cut off point. A score of 3 or more is positive and should be further evaluated by GAD-7 or a mental health referral should be made. In the current study the depression score ranged between 0 - 6 with a mean depression score of 2.79+1.99, while anxiety score ranged between 0 - 6 with a mean depression score of 2.81+1.89.

Table 5 present frequency distribution of Quality of Life scale items of the undergraduate nursing students and nurse internes included in the study. The total Quality of life (QOL) score ranged between 12 and 60 with a mean QOL score of 39.54+9.26.

Analysis of variance showed a statistically significant correlation between perceived mental health and previous history of COVID-19 symptoms and testing positive to COVID-19 virus ( $p= 0.02, 0.001$ ) while no relation was detected between perceived mental health and consultation regarding COVID-19 or having any other physical health problem ( $p= 0.09, 0.5$ ) (Table 6).

As shown in table 7, no relation was detected between perceived quality of life and previous history of COVID-19 symptoms, testing positive to COVID-19 virus, consultation regarding COVID-19 or having any other physical health problem ( $p= 0.88, 0.73, 0.06, 0.50$  consecutively).

As shown in table 8 data analysis indicated highly statistically significant correlations between perceived social support and the satisfaction of the received support and mental health scores among the students and interns ( $p = 0.000$ ) indicating that those students and interns who were highly satisfied with the social support they receive experienced high scores of mental health and vice versa.

As displayed in table 9 data analysis indicated statistically significant correlations between perceived social support and the satisfaction of the received support and quality of life scores among the students and interns ( $p = 0.01$ ) indicating that those students and interns who were highly satisfied with the social support they receive experienced high scores of quality of life scale and vice versa. No statistically significant correlation has been detected between quality of life and perceived mental health ( $r=0.089, p= 0.148$ ) among study participants. In testing the relationship between collected sociodemographic variables and both mental health and quality of life scores, results of the current study only showed a significant correlation between parents' education and both mental health and quality of life scores ( $p= 0.03, 0.01$ consequativly) while no relation was detected between both mental health and quality of life scores and participants age, marital status, occupation, living arrangement, academic level or GPA.

## DISCUSSION

The word "should" set the tone for a bittersweet storm that swept across the globe. In an effort to reduce the storm's consuming effects, society came to a halt. Stress, worry, and depression are typical symptoms among graduate

**Table 6.** Correlation between COVID-19 and mental health status among undergraduate nursing students and nurse internes (n = 264).

| Variable                                                        | Mean | F     | p     |
|-----------------------------------------------------------------|------|-------|-------|
| Do you have any previous history of COVID-19 symptoms?          |      |       |       |
| Yes                                                             | 6.18 | 5.46  | 0.02  |
| No                                                              | 5.15 |       |       |
| Have you ever tested positive to COVID-19?                      |      |       |       |
| Yes                                                             | 5.55 | 10.42 | 0.001 |
| No                                                              | 5.09 |       |       |
| Have you had any consultation with a specialist about COVID-19? |      |       |       |
| Yes                                                             | 4.89 | 2.78  | 0.096 |
| No                                                              | 5.79 |       |       |
| Do you have any physical illnesses?                             |      |       |       |
| Yes                                                             | 5.27 | 0.29  | 0.59  |
| No                                                              | 5.65 |       |       |

**Table 7.** Correlation between COVID-19 and quality of life among undergraduate nursing students and nurse internes (n = 264).

| Variable                                                        | Mean  | F     | p    |
|-----------------------------------------------------------------|-------|-------|------|
| Do you have any previous history of COVID-19 symptoms?          |       |       |      |
| Yes                                                             | 23.66 | 0.024 | 0.88 |
| No                                                              | 39.48 |       |      |
| Have you ever tested positive to COVID-19?                      |       |       |      |
| Yes                                                             | 39.32 | 0.12  | 0.73 |
| No                                                              | 39.71 |       |      |
| Have you had any consultation with a specialist about COVID-19? |       |       |      |
| Yes                                                             | 41.55 | 3.39  | 0.06 |
| No                                                              | 39.00 |       |      |
| Do you have any physical illnesses?                             |       |       |      |
| Yes                                                             | 38.47 | 0.46  | 0.50 |
| No                                                              | 39.68 |       |      |

students pursuing a degree in the health care professions. The emergence of the COVID-19 pandemic is likely to exacerbate these problems. Graduate nursing students are unique in that they are exposed to both clinical pressures and the rigors and stressors associated with a graduate-level education. The COVID-19 outbreak has put medical professionals in an unprecedented predicament around the world, forcing them to make tough decisions and work under intense pressure, which may make it challenging for some to handle the situation appropriately. The current study investigated how COVID-19 affected nursing students' and nurse interns' mental health and quality of life.

In the present study, majority of the sample

comprised of 88.64% nursing students from different academic levels and 30% of nurse interns and their age ranged between 18-26 years. Results indicated that history of exposure to COVID-19, more than one third (34.85%) had history of COVID-19 symptoms while 43.18% were tested positive to COVID-19 and only 21.21% had consultation with a specialist about COVID-19. In contrast, just 0.6 % among 540 nursing students in a research (Hai et al., 2022) had COVID-19 and recovered while 94.4% had COVID -19 infection. These findings have the knock-on effect that a diagnosis of COVID-19 is probably linked to higher rates of mental health issues and future psychiatric diagnoses.

In the current study the total mental health



score of the participants ranged between 0 and 12, considering depression and anxiety both of its score ranged between 0 – 6. Study conducted by (Gao et al., 2020) 1,780 college nursing students participated in the online survey, providing 1,532 complete replies, of which, (44.5%) reported having PTSD, 22.8% of them had sleeplessness, and only a small number of them (2.9%), had anxiety and depression symptoms. On contrary, according to (Pan et al., 2021) an unheard-of health crisis may have caused the symptoms to be more severe than usual. Instead of COVID-related causes, major depressive disorder or generalized anxiety disorder may be caused by a combination of hereditary characteristics and lifetime environmental conditions. Those with the highest burden of mental diseases experienced fewer depressive symptoms and concerns during the COVID-19 pandemic than those with lower burdens. Those who had poor mental health prior to the pandemic may only experience a limited amount of stress as a result of the pandemic. According to WHO the imposing measures like social isolation might make people feel more stressed, anxious, and angry (WHO, 2020). Social isolation was found to be closely related to suicidal thoughts, anxiety, and sadness (Matthews et al., 2019). Nursing students' mental health issues are exacerbated by the urge to study online for numerous reasons (Gao et al., 2021). Clinical training interruption can also take a role in mental health, in addition to the broader issues already discussed. With research conducted in various nations, it was found that, variations in the COVID-19 epidemic situation, national culture, student lifestyle, educational program characteristics, and other factors, resulted in differences in mental health levels. Whatever is the reason or situation, from the results of the current study it is evident that those nursing students and nurse interns need to be referred for further mental health treatment.

Young adults' self-perceived health is a reliable measure of their mental health and is independently correlated with their physical health and health-related behaviour's (Craig et al., 2018). In the current research, more than three quarters of the study participants (79.55%) had received family support, and from those participants more than half of them (52.65%) revealed that they were extremely satisfied with the support they received while one third (33.33%) were moderately satisfied and only 14% were not at all satisfied with

the family support they received. The current body of research advises looking for social support. People frequently turn to close friends, family, and coworkers for support, advice, and problem-solving help when they encounter difficulties or uncomfortable emotions in their daily life (Vélez et al., 2016). People who were under a lot of stress were more likely to seek help than people who were under less stress (Li, 2015). These findings suggest that nursing universities should think about offering nursing students access to useful social networks, such as psychological counseling websites or hotlines, to help them deal with challenging circumstances and avoid mental health issues.

Quality of life among nursing students and nurse internes was perceived as important in the current study with an overall mean score of 39.54+9.26. More than a moderate level of the participants was satisfied on their quality of life, 23.86 % of them felt being safe during the pandemic, received all information's needed for their daily life, had a better relationship and good support from their friends and family than normal time, were able to have good access to health care services, and their faith and spiritual practices was improved. Regarding income during COVID -19 10.61% were dissatisfied, on the other hand 11.36% were very satisfied, while 23.11 % were satisfied, which indicates no much impact of financial problems. Examining nursing students' and nurse interne's quality of life, especially during a pandemic, emphasizes how important it is to have a healthy body and mind, with the lack of either having a negative impact on the other. Understanding this during this difficult time shows the general wellbeing of them who are still fighting to meet their academic obligations (Cruz et al., 2018).

Considering the relationship between selected demographic variables and mental health status among undergraduate nursing students and nurse internes, results showed a statistically significant correlation between perceived mental health and previous history of COVID-19 symptoms and testing positive to COVID-19 virus, also indicated highly statistically significant correlations between social support and mental health among nursing students and interns, signifying that those nursing students and nurse internes who were highly satisfied with the social support they received experienced high scores of mental health and vice versa (Falguera et al., 2020). Found a favourable correlation between participants' perceived health and psychological well-being



**Table 8.** Frequency distribution of mental health status items of undergraduate nursing students and nurse internes (n = 264).

| Variable                                                     | Mean | F     | p     |
|--------------------------------------------------------------|------|-------|-------|
| From your perspective, do you receive enough family support? |      |       |       |
| Yes                                                          | 7.52 | 20.99 | 0.000 |
| No                                                           | 5.10 |       |       |
| How much are you satisfied with the support you receive?     |      |       |       |
| Extremely satisfied                                          | 3.87 | 17.36 | 0.000 |
| Very much satisfied                                          | 4.77 |       |       |
| Moderately satisfied                                         | 6.77 |       |       |
| Not at all satisfied                                         | 7.76 |       |       |

**Table 9.** Correlation between social support and quality of life among undergraduate nursing students and nurse internes (n = 264).

| Variable                                                     | Mean  | F    | p    |
|--------------------------------------------------------------|-------|------|------|
| From your perspective, do you receive enough family support? |       |      |      |
| Yes                                                          | 40.27 | 6.43 | 0.01 |
| No                                                           | 36.72 |      |      |
| How much are you satisfied with the support you receive?     |       |      |      |
| Extremely satisfied                                          | 41.64 | 3.84 | 0.01 |
| Very much satisfied                                          | 40.13 |      |      |
| Moderately satisfied                                         | 38.99 |      |      |
| Not at all satisfied                                         | 35.59 |      |      |

all through the pandemic. This suggests that students who scored highly on perceived health were also more likely to score highly on psychological well-being, and an empirical research has demonstrated a reciprocal relationship between the two. Lower perceived health status was most certainly linked to the emergence of anxiety disorders. Having poor general health may imply a higher chance of mental health issues (Liu et al., 2020). The fear of COVID-19 and depression have been linked in numerous researches, according to a study (Rodríguez-Hidalgo et al., 2020). This fear has been a contributing factor to depression. In general community suicide rates have been linked to depression and COVID-19-dread (Mamun & Griffiths, 2020). Additionally, a prior study with comparable results found that pupils showed strength and resilience, which were mostly brought on by their social connections and the presence of support systems (Panza et al., 2022). From the analysis it can be inferred that, having poor general health may imply a higher chance of mental health issues.

Regarding the quality of life there was statistically significant correlation between social support and quality of life scores among

the students and interns indicating that those students and interns who were highly satisfied with the social support they receive experienced high scores of quality of life scale and vice versa. As well among the sociodemographic variables, there was significant correlation between parent's education and both mental health and quality of life, but no relation was detected between perceived quality of life and previous history of COVID-19 symptoms, testing positive to COVID-19 virus, consultation regarding COVID-19 or having any other physical health problem. Higher levels of family, friend, and significant other social support were found to be significant predictors of higher psychological quality of life in a study on quality of life conducted (Cai et al., 2020). In contrast, greater depression severity and the belief that one lived in a region with a high incidence of COVID-19 cases strongly predicted lower psychological quality of life. Higher social support was linked to reduced anxiety and depression, whereas lower social support was linked to higher anxiety and depression, according to studies on the general population and healthcare workers during the COVID-19 pandemic. Having a wider social network,

being more socially integrated, and receiving more family and friend support are additional factors that reduce the risk of depression (Nguyen et al., 2016). The results suggest that further research into the semantic evaluation of quality of life in the Saudi context or the Arab region is necessary.

## CONCLUSION

Even though this study was carried just a few months after the outbreak, it adequately illustrates the psychological impacts of the COVID-19 pandemic. The researchers tried to provide an overview of the influence of COVID - 19 pandemic on undergraduate nursing students and nurse interns after the COVID-19 lockdown. The results of the current study indicate that some of those nursing students and nurse interns who were included in the study experienced some negative impacts on their psychological health as evidenced by a statistically significant correlation between perceived mental health and previous history of COVID-19 symptoms and testing positive to COVID-19 virus, in addition, perceived satisfaction with social support had a major role in the perception of mental health and perceived quality of life as those students and interns who were highly satisfied with the social support they receive experienced high scores of mental health and quality of life and vice versa. Based on the findings of this study, the following recommendations are proposed (1) Universities must make the most of COVID – 19 pandemic experience and revamp their available e-teaching and e-learning strategies; (2) Routine screening of all nursing students and nurse interns to early identify high risk vulnerable candidates in a timely manner; (3) The vulnerable nursing students and nurse interns should have access to psychological first aid services in order to facilitate their mission of a successful career as nurses; (4) Nursing students and nurse interns should have an access and confidential referral system to specialized psychiatric and mental health counselling services, therapies, and other support systems put in place to ensure their mental health integrity against the negative consequences of COVID - 19 pandemic; and (5) Involve nursing students and nurse interns' families on educational programs to address the impacts of social support on minimizing the negative consequences of exposure to COVID – 19 infections.

## Declaration of Interest

*The authors declare that they have no conflict of interests with any organization regarding the materials discussed in this manuscript.*

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## Data Availability

*The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.*

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# Relationship between hypercholesterolemia and sleep quality among older adults

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## ABSTRACT

**Background:** Hypercholesterolemia refers to the buildup of fat in the blood, leading to the accumulation of fatty deposits on the walls of blood vessels, known as atherosclerosis. High cholesterol levels can adversely affect health, including the sleep quality of the older adults, leading to physical and psychological health issues.

**Objective:** This study aims to examine the relationship between hypercholesterolemia and sleep quality among older adults.

**Methods:** A cross-sectional design was utilized in this study, with a sample size of 60 respondents selected through purposive sampling. Data collection involved the use of a cholesterol level observation sheet and the Pittsburgh Sleep Quality Index (PSQI) questionnaire. Data analysis was conducted using the Spearman Rank correlation.

**Results:** The results revealed a significant relationship between hypercholesterolemia and sleep quality in the older adults ( $p < 0.0001$ ;  $r = 0.802$ ). This indicates a positive correlation between hypercholesterolemia and sleep quality among the older adults.

**Conclusions:** The study concludes that as hypercholesterolemia levels become more normalized, sleep quality improves. Conversely, higher levels of hypercholesterolemia are associated with poorer sleep quality in the older adults.

**Keywords:** older adults; hypercholesterolemia; sleep quality

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## INTRODUCTION

Older adults individuals experience a gradual loss of tissue's ability to repair itself and maintain its normal structure and function, which makes them more susceptible to infections and impairments in repairing damage (Montecino-Rodriguez et al., 2013). Several health problems arise due to lifestyle changes, dietary factors, environmental influences, lack of physical activity, stress, and aging. One such condition associated with diet and age is hypercholesterolemia, characterized by high cholesterol levels and the accumulation of fat in the bloodstream. Elevated cholesterol levels can have detrimental effects on health, increasing the risk of heart disease (Palatini et al., 2023). In the older adults, high cholesterol levels can also lead to sleep difficulties, negatively impacting physical and psychological health, as well as increasing health risks and



## Nursing and Healthcare Practices

- *Hypercholesterolemia and sleep quality are significantly related among older adults.*
- *Normalization of hypercholesterolemia levels leads to improved sleep quality in older adults.*
- *Higher levels of hypercholesterolemia are associated with poorer sleep quality in older adults.*

impairing immune system function.

According to the World Health Organization (WHO) in 2018, the global prevalence of hypercholesterolemia in adults was 37% for men and 40% for women. In Indonesia, data from the 2018 Basic Health Research (RISKESDAS) showed that the prevalence of high cholesterol was 52.3%, with the majority of cases occurring in individuals above 60 years of age (Riskesdas, 2018). The province of East Java, ranking 23rd out of 34 provinces in Indonesia, had a prevalence of high cholesterol in 2,967 out of 8,225 individuals tested.

Cholesterol, a type of lipid, is a modifiable risk factor for hypertension. Higher total cholesterol levels increase the likelihood of developing hypertension (Kotani et al., 2010; Zaki et al., 2020). Elevated cholesterol levels pose a serious health concern as they contribute to various non-communicable diseases (Arifin et al., 2022). Excessive cholesterol in the blood can lead to dangerous consequences for heart and blood vessel health. The accumulation of fat deposits on blood vessel walls can result in atherosclerosis, causing blockages and potentially leading to conditions such as fatigue, sleepiness, leg pain, neck pain, myocardial infarction (heart attack), and even death (Bista et al., 2021).

Factors such as age, obesity, consumption of fatty foods, unhealthy lifestyles, smoking, drinking alcohol, and lack of exercise contribute to elevated cholesterol levels. Additionally, heredity can also play a role in increased blood cholesterol levels (Sharifi-Rad et al., 2020). Hypercholesterolemia leads to the buildup of cholesterol plaque in the blood, which narrows blood vessels and impedes smooth blood flow (Hansson & Libby, 2006; MB & Ganz, 1997).

Sleep pattern changes significantly impact the quality and quantity of sleep and rest in the older adults. Sleep quality complaints may stem from natural aging processes or a combination of factors related to old age (Miner & Kryger, 2017). Good-quality sleep is essential for the older adults to improve health and restore their bodies. Sleep quality in the older adults encompasses not only a state of complete calm but also attention to the sleep cycle process. Factors such as disease, stress, medications, nutrition, environment, motivation, and activities can influence sleep quality decline in the older adults (Shochat, 2012; Suzuki et al., 2017).

Pharmacological treatments for hypercholesterolemia include the administration of normolipidemic drugs such as statins, fibrates, resins, selective cholesterol absorption inhibitors, and nicotinic acid. Lifestyle modifications, such as maintaining a healthy diet, engaging in regular physical activity, avoiding fatty foods, adopting a healthy lifestyle, ensuring adequate rest, and managing sleep quality, are also crucial in preventing high cholesterol levels. Given the aforementioned background, the researchers are motivated to investigate the relationship between hypercholesterolemia and sleep quality in the older adults.

## METHODS

### Design

The research design used in this study is a cross-sectional research design, which involves measuring or observing the independent and dependent variables at a single point in time (Nursalam, 2017).

### Sample and Setting

The sample in this study consists of the older adults population suffering from hypercholesterolemia within the Klatak Health Center Work Area, with a total of 60 respondents. Inclusion criteria are based on the general characteristics of the research subjects from a target population that is accessible and will be studied (Nursalam, 2017). The inclusion criteria include older adults individuals suffering from hypercholesterolemia who are willing to participate as respondents. Exclusion criteria involve removing subjects or samples that do not meet the inclusion criteria or are not suitable for the research (Nursalam, 2017). Examples of exclusion criteria include uncooperative older

**Table 1.** Characteristics of respondents (n=60).

| Category        | n  | %    |
|-----------------|----|------|
| Age             |    |      |
| 45-55 years old | 15 | 25.0 |
| 56-65 years old | 34 | 56.7 |
| >65 years old   | 11 | 18.3 |
| Gender          |    |      |
| Male            | 23 | 38.3 |
| Female          | 37 | 61.7 |
| Cholesterol     |    |      |
| Normal          | 3  | 5.0  |
| High limit      | 24 | 40.0 |
| High            | 33 | 55.0 |
| Sleep quality   |    |      |
| Good            | 4  | 6.7  |
| Light           | 9  | 15.0 |
| Medium          | 13 | 21.7 |
| Bad             | 34 | 56.7 |

**Table 2.** Relation between hypercholesterolemia and sleep quality of elderly (n=60).

| Hypercholesterol | Sleep Quality |          |           |           |           | p       | r     |
|------------------|---------------|----------|-----------|-----------|-----------|---------|-------|
|                  | Good          | Light    | Medium    | Bad       | Total     |         |       |
|                  | n (%)         | n (%)    | n (%)     | n (%)     | n (%)     |         |       |
| Normal           | 3 (5.0)       | 0 (0.0)  | 0 (0.0)   | 0 (0.0)   | 3 (5.0)   | <0.0001 | 0.802 |
| High limit       | 1 (1.7)       | 9 (15.0) | 10 (16.7) | 4 (6.7)   | 24 (40.0) |         |       |
| High             | 0 (0.0)       | 0 (0.0)  | 3 (5.0)   | 30 (50.0) | 33 (55.0) |         |       |
| Total            | 4 (6.7)       | 9 (15.0) | 13 (21.7) | 34 (56.7) | 60 (100)  |         |       |

adults individuals or those not present during the examination.

### Variable

The independent variable is the factor that influences the occurrence of the dependent variable (Nursalam, 2017). In this study, the independent variable is hypercholesterolemia, while the dependent variable is sleep quality.

### Instruments

The measurement of cholesterol levels uses the Glucose Cholesterol Urid (GCU) method, and an observation sheet is employed. Total cholesterol levels are categorized as normal, borderline high, or high. The Pittsburgh Sleep Quality Index (PSQI) is a questionnaire used to assess sleep quality, consisting of seven components: subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleeping pills, and daytime

dysfunction. Sleep quality is classified as good (scores 1-5), mild (scores 6-7), moderate (scores 8-14), or poor (scores 15-21). The scores of the seven components are summed to obtain a global score ranging from 0 to 21. A global score <5 indicates good sleep quality, while a score >5 indicates poor sleep quality (Liu et al., 2021).

### Data Analysis

The data were analyzed using Spearman Signed Rank Test with the significance of  $p < 0.05$ .

### Ethical Consideration,

This study has obtained ethical approval from the Klatak Banyuwangi Public Health Center with approval number 069/01/KEPK-STIKESBW/II/2022.

## RESULTS

Table 1 indicates that over half of the total respondents fall within the age range of 56-65 years, with the majority being female. The study reveals that more than 50% of the participants have high cholesterol levels and experience poor sleep quality.

The findings from the aforementioned study revealed that out of the 60 respondents, nearly half of them (34 respondents, 56.7%) had hypercholesterolemia and poor sleep quality. The analysis of the Spearman rank test yielded a P-value of  $<0.0001$ , indicating ( $p < 0.05$ ) that the alternative hypothesis is accepted and the null hypothesis ( $H_0$ ) is rejected. This implies that there is a significant relationship between hypercholesterolemia and sleep quality among older adults. Furthermore, the strong correlation coefficient of 0.802 indicates a robust and highly significant association (Table 2).

## DISCUSSION

Our study revealed that cholesterol levels have a significant correlation with sleep quality. The findings of this study are consistent with research conducted by Barikani et al., (2019); Xing et al. (2020). Hypercholesterolemia refers to an increase in cholesterol concentration in the blood exceeding the normal limit. Older adults experience various changes in organ function, including decreased elasticity in blood vessels due to the deposition of atherosclerotic materials, including cholesterol (Dai et al., 2015).

Out of the 60 respondents, 30 (50.0%) predominantly experienced high cholesterol levels along with poor sleep quality. A study by Maryati (2017) reported that the majority (52.9%) of respondents had high cholesterol levels based on a statistical test using the Spearman rank test technique with a significance level of 0.05. Additionally, Gangwisch et al. (2010) stated that short sleep quality in older adults can be a significant risk factor for higher cholesterol levels compared to younger age groups, as observed in the cross-tabulation table where 34 respondents (56.7%) had hypercholesterolemia along with poor sleep quality.

Among the respondents, 30 (50.0%) had high cholesterol levels accompanied by poor sleep quality. This can be attributed to signs commonly experienced by older adults with hypercholesterolemia, such as difficulty falling asleep for 30 minutes while lying down, waking

up during the night, extended sleep duration, and frequent use of sleep medication. In the category of high cholesterol with moderate sleep quality, 3 (5.0%) respondents were observed, indicating difficulties in initiating sleep. In the high cholesterol category with poor sleep quality, 4 (6.7%) respondents experienced breathing difficulties during sleep, frequent waking to use the bathroom, and pain or headaches during the day. Moreover, 10 (16.7%) respondents in the high cholesterol category had moderate sleep quality, experiencing symptoms such as snoring and frequent chills at night. Additionally, 9 (15.0%) respondents in the high cholesterol category had light sleep quality, including discomfort and restlessness during sleep, and daytime drowsiness. Only 1 (1.7%) respondent in the high cholesterol category demonstrated good sleep quality, occasionally experiencing nightmares.

Poor sleep quality is associated with various negative outcomes. Physiologically, insufficient sleep duration can negatively impact the immune system and lead to metabolic changes, including increased insulin resistance (Grandner et al., 2016). The results of the study align with findings by Barikani et al., (2019); Chen et al. (2022); Pu Lin et al., (2017), who reported a significant relationship between sleep quality and lipid (cholesterol) levels in older adults. The study's outcomes are consistent with existing theories, as the research considered other factors that can affect cholesterol levels, including physical activity, age, and specific diseases. Age is a significant risk factor for elevated blood cholesterol levels, as total cholesterol levels tend to be higher in older individuals compared to younger age groups. Older individuals are more prone to high cholesterol due to reduced physical activity compared to their teenage and childhood years (Ou et al., 2017).

For older adults with hypercholesterolemia, preventive measures such as maintaining a sleep duration or sleep quality of 7-8 hours are recommended. Proper disease management, including regular health check-ups, monitoring cholesterol levels, adopting a healthy diet, and adhering to prescribed medication, can help minimize complications associated with hypercholesterolemia.

## Conclusions

Hypercholesterolemia is predominantly categorized as high among older adults in

the working area of the Klatak Health Center. Additionally, almost half of the older adults in the same area exhibit poor sleep quality. The statistical analysis confirms a very strong relationship, indicating a significant correlation between hypercholesterolemia and sleep quality among older adults in the working area of the Klatak Health Center. The findings of this study provide valuable information for healthcare workers, especially nurses, to implement cholesterol management strategies among older adults.

### Declaration of Interest

No conflict of interest

### Acknowledgment

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### Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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# Relationship between preoperative fluid therapy and the occurrence of nausea and vomiting in post-spinal anesthetic patients

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## ABSTRACT

**Background:** Spinal anesthesia can cause a significant decrease in blood pressure and increased vagal tone, leading to bradycardia, nausea, and vomiting. To mitigate the risk of nausea and vomiting, it is important to provide appropriate fluid therapy during fasting or anesthesia.

**Objective:** This study aims to determine the relationship between preoperative fluid therapy and the occurrence of nausea and vomiting events in post-spinal anesthetic patients at Dr. Saiful Anwar Hospital, Malang.

**Methods:** This research employed an observational analytic design with a cross-sectional approach. A purposive sampling technique was used, and 50 respondents were selected. The research instrument included the Rhodes Index of Nausea, Vomiting, and Retching (RINVR) observation sheet and fluid calculation formulas. The statistical test employed was Spearman's rho with a 95% confidence interval (CI) or a significant level value ( $\alpha$ ) of 0.05.

**Results:** The results showed that 52% of respondents did not experience nausea and vomiting, 44% experienced mild nausea and vomiting, and 4% experienced moderate nausea and vomiting. The Spearman Rank statistical test yielded a p-value of  $< 0.0001$ .

**Conclusions:** In conclusion, there was a significant relationship between preoperative fluid therapy and the incidence of nausea and vomiting in post-spinal anesthesia patients. Therefore, administering adequate fluids before spinal anesthesia can reduce the risk of complications, such as nausea and vomiting, associated with spinal anesthesia.

**Keywords:** preoperative; fluid therapy; nausea; vomiting; spinal anesthesia

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## INTRODUCTION

Nausea and vomiting are common symptoms associated with spinal anesthesia, with an incidence rate of approximately 25% (Artawan et al., 2020). The causes of nausea and vomiting in spinal anesthesia include hypotension, which is the primary cause that can be immediately resolved with prompt treatment; hypoxia, the second major cause, which can be effectively managed through oxygen therapy; and anxiety or other

## Nursing and Healthcare Practices

- *Preoperative fluid therapy plays a crucial role in reducing the incidence of nausea and vomiting in post-spinal anesthesia patients.*
- *Administering adequate fluids before spinal anesthesia is recommended to minimize the risk of complications, particularly nausea and vomiting.*
- *The study found a significant relationship between preoperative fluid therapy and the occurrence of nausea and vomiting in patients who underwent spinal anesthesia.*

psychological factors, which can be addressed through proper explanation of the procedure or the administration of sedatives. Other contributing factors include the use of narcotics as premedication, increased parasympathetic activity resulting from spinal block affecting gastrointestinal sympathetic control, and mechanical stimulation of the intestines during the procedure. Nausea and vomiting during surgery not only lead to unfavorable surgical outcomes but also increase the risk of aspiration (Nowak et al., 2022). These symptoms can contribute to higher morbidity, longer hospital stays, increased treatment costs, patient distress, and reduced comfort. Many patients consider nausea and vomiting to be more bothersome than the surgery itself (Gress et al., 2020).

In the United States, approximately 71 million patients undergo surgery each year, with the incidence of postoperative nausea and vomiting ranging from 20% to 30% in general surgeries and approximately 70% to 80% in high-risk groups (Mallin et al., 2019). According to Jin, Gan, and Bergese (2020), nausea and vomiting are common complications associated with spinal anesthesia, occurring in 20% to 40% of cases. However, the precise incidence of postoperative nausea and vomiting in Indonesia has not been clearly recorded. Karnina and Salmah (2022) reported an incidence rate of 27.08%.

Spinal anesthesia offers numerous advantages, including its simplicity, rapid onset, minimal risk of systemic toxicity,

effective anesthesia, well-known methods for prevention and management of complications, reliable analgesia, and minimal impact on the baby during cesarean sections (Szpilman and Morgan, 2021). Despite these benefits, spinal anesthesia carries the risk of hypotension, which is considered a major cause of postoperative morbidity and mortality (Agerskov et al., 2021). Therefore, it is crucial to carefully select drugs and anesthesia techniques to ensure patients recover quickly without experiencing side effects, particularly nausea and vomiting (Jin et al., 2020). Spinal anesthesia can lead to a significant decrease in blood pressure, increased vagal tone, bradycardia, and nausea and vomiting. Hypotension can cause hypoxemia and hypoperfusion in the chemoreceptor trigger zone (CTZ), the center responsible for initiating vomiting reflexes (Turgut and Arslan, 2019).

Side effects of anesthesia must be promptly addressed as they can have detrimental effects on the patient. The management of nausea and vomiting can involve both pharmacological and non-pharmacological therapies. According to Virgiani (2019), pharmacological therapy includes the use of 5-HT<sub>3</sub> antagonist drugs, antihistamines, dopamine antagonists, and anticholinergics. Additionally, the effectiveness of a non-pharmacological approach, namely ensuring sufficient hydration through the administration of preoperative fluids. Their study on the effectiveness of administering Ringer's lactate at a rate of 2ml/kgBW/hour during fasting demonstrated positive results.

Preloading patients undergoing spinal anesthesia with 1-2 liters of intravenous fluids (crystalloid or colloid) is a common practice to prevent hypotension during the procedure. This fluid administration is rational as it aims to increase the volume and compensate for the decrease in peripheral resistance in the bloodstream (Sofullah et al., 2022).

According to Gan et al. (2019), Postoperative Nausea and Vomiting (PONV) comprises three main symptoms: nausea, vomiting, and retching. Nausea is a subjective sensation of the urge to vomit without the actual expulsion of stomach contents. Severe nausea can be accompanied by increased salivary gland secretions, vasomotor disturbances, and sweating. Vomiting, or emesis, refers to the passage of gastric contents through the mouth, while retching is the unproductive urge to vomit. Nausea and vomiting can be categorized as immediate (occurring 2-6 hours after surgery)

or delayed (occurring more than 24-48 hours after surgery).

A preliminary study conducted at Dr. Saiful Anwar Hospital in Malang during January 2021 involved 66 patients who underwent spinal anesthesia. Samples were taken from 20 patients, two of whom experienced nausea and vomiting after the procedure, and two patients experienced it during the recovery period. Based on interviews and document analysis, it was found that when patients experienced nausea and vomiting, they were placed in a sideways position. As a result, these patients required additional time in the recovery room, usually around 1-2 hours. This background prompted the authors' interest in conducting research to determine the relationship between preoperative fluid requirements and the incidence of nausea and vomiting in patients undergoing spinal anesthesia.

## METHODS

### Design

The research design used in this study was observational and analytic, employing a cross-sectional approach.

### Participants and Setting

The study population consisted of all patients who underwent surgery with spinal anesthesia and met the specified criteria. A total of 57 patients from the Anesthesia Installation were included. The inclusion criteria were as follows: (1) Willingness to participate as a respondent, (2) Undergoing surgery with spinal anesthesia, (3) Age between 18 and 55 years, (4) American Society of Anesthesiologists status (ASA) scores of 1 and 2, and (5) Not receiving anti-inflammatory drugs that cause nausea and vomiting. The exclusion criteria were: (1) Patients with decreased consciousness, (2) Patients with kidney disorders, and (3) Patients with heart problems. Non-probability sampling was employed in this study, specifically using purposive sampling. From the population of patients who underwent spinal anesthesia and met the inclusion and exclusion criteria, a sample of 50 respondents was selected.

### Instruments

The instruments used in this study included an interview sheet covering the patient's information and observation sheets documenting the time of the last meal and

drink, as well as the amount of fluid consumed since then until the time before spinal anesthesia was administered in the operating room. To measure the incidence of nausea and vomiting, an observation sheet based on the Rhodes Index of Nausea, Vomiting, and Retching (RINVR) scale of 0-32 was used on postoperative patients who received spinal anesthesia (Juartika, Harmi, and Fatmadona, 2020).

### Data Collection

The data collection process involved several stages: (1) Reviewing patient data from the register book of those who underwent spinal anesthesia, (2) Recording data in the patient's medical record and the nurse's report book for patients who underwent spinal anesthesia, (3) Selecting research samples based on predetermined timeframes and the specified inclusion and exclusion criteria, and (4) Assessing the fulfillment of preoperative fluid requirements and the incidence of nausea and vomiting in post-spinal anesthesia patients. Data collection took place in the operating room, starting when the patient was about to receive spinal anesthesia and concluding when the patient left the operating room. Observation occurred before spinal anesthesia, involving a review of the patient's medical record and/or direct questioning of the patient regarding the amount of fluid received during fasting. Following the administration of spinal anesthesia, observations were made by directly asking the patient whether they experienced nausea and vomiting, as the patient remained conscious. The researchers or enumerators (anesthetist nurses and resident anesthetic doctors) facilitated these observations using prepared observation sheets. Data collection methods included interviews and direct observations to determine the occurrence of nausea and vomiting in postoperative patients who received spinal anesthesia.

### Data Analysis

The study aimed to analyze the incidence of nausea and vomiting in post-spinal anesthesia patients using the Spearman rank correlation test with a significance level of  $\alpha = 95\%$ .

### Ethical Consideration

This research underwent an ethical review at Dr. Saiful Anwar Hospital, Malang. Information that passed the ethical review received

an ethical approval letter with the number 400/231/K.3/302/2021.

## RESULTS

Based on Table 1, the majority of respondents are male, a total of 26 people (52%). The age of the respondents in this study ranged from 18-55 years. Most respondents were in the age range of 18-35 years as many as 22 (44%) respondents. Most of the respondents were as many as 28 respondents (56%) with the fulfillment of preoperative fluid needs less than the needs. 52% of respondents (26 people) did not experience nausea and vomiting, 44% experienced mild nausea and vomiting and the remaining 4% of respondents (2 people) had moderate nausea and vomiting.

Table 2 shows that (52%) of respondents did not experience nausea and vomiting in which some respondents (28 respondents) meeting their preoperative fluid needs were less than their needs. The results of the Spearman Rank statistical test obtained a value of  $p < 0.0001$  or  $p > 0.05$ , which means that  $H_1$  is accepted so that it can be concluded that there is a significant relationship between preoperative fluid requirements and the incidence of nausea and vomiting in post-spinal anesthesia patients at the Anesthesia Installation. The strength of the relationship between the two variables is 0.826, in the category of very strong correlation. The direction of the relationship is positive, with the fulfillment of preoperative fluid needs that are sufficient to reduce the incidence of post-spinal nausea and vomiting in the Anesthesia Installation.

## DISCUSSION

Based on the results of the study, the relationship between meeting preoperative fluid needs and the incidence of nausea and vomiting showed that out of 50 respondents, there were 28 respondents (56%) who had fluid needs that were less than required, 20 respondents (40%) who had preoperative fluid needs that were sufficient, and the remaining 2 respondents (4%) who had an excess of fluid needs. This is in line with research conducted by Jin et al. (2020), which found that meeting fluid needs adequately during fasting or anesthesia can reduce the risk of hypotension, which can result in nausea and vomiting.

Changes in fluid balance are one of the physiological changes in the perioperative period, especially in patients undergoing surgery.

Patients are required to fast preoperatively for 6-8 hours to avoid intraoperative complications such as aspiration. However, during this fasting period, the body continues to lose fluid through metabolism (Iqbal et al. 2019). According to Gianotti et al. (2020), the principle of giving preoperative fluids is to replace the fluids and calories lost by preoperative patients due to fasting.

In the administration of preoperative fluids, patients are given preloading before surgery because crystalloid fluids only last for a short period of time. The formula for giving fluids, known as the 4-2-1 calculation, is closest to the average human body's needs. Alternatively, fluid therapy instead of fasting can also be formulated as 2cc/kgBW/hour of fasting (Gan et al. 2019). According to Puri, Bandyopadhyay, and Ashok (2023), the daily fluid requirement can be determined using the Holiday Fresh formula, which replaces fluid lost through urine formation, gastrointestinal secretions, sweat, and expulsion of fluid through the lungs, also known as insensible losses.

The results of this study showed that out of 50 respondents, 26 respondents (52%) did not experience nausea and vomiting, 22 respondents (44%) experienced mild nausea and vomiting, and 2 respondents (4%) experienced moderate nausea and vomiting. This is consistent with the research conducted by Artawan et al. (2020), which found that spinal anesthesia can cause a significant decrease in blood pressure and increased vagal tone, leading to bradycardia, nausea, and vomiting.

Furthermore, in this study, it was observed that the majority of respondents who experienced nausea and vomiting were male, with 14 male respondents compared to 10 female respondents. Additionally, the age group of 46-55 years experienced the highest incidence of nausea and vomiting. This is in line with the theory that states that nausea and vomiting can be influenced by factors such as age, gender, obesity, and psychological factors.

According to Turgut and Arslan (2019), Post Operative Nausea Vomiting (PONV) consists of three main symptoms: nausea, vomiting, and retching. Nausea is the subjective sensation of wanting to vomit without expulsive muscle movements, and severe nausea is associated with increased salivary gland secretions, vasomotor disturbances, and sweating. Vomiting or emesis refers to the passage of gastric contents through the mouth, while retching is an unproductive urge



**Table 1.** Participants Characteristics (n=50)

| Variable                                           | n  | %  |
|----------------------------------------------------|----|----|
| Gender                                             |    |    |
| Man                                                | 26 | 52 |
| Woman                                              | 24 | 48 |
| Age                                                |    |    |
| 18 - 35 years                                      | 22 | 44 |
| 36 - 45 years                                      | 12 | 24 |
| 46 - 55 years                                      | 16 | 32 |
| Criteria for Preoperative Fluid Requirements       |    |    |
| Over                                               | 2  | 4  |
| Moderate                                           | 20 | 40 |
| Less                                               | 28 | 56 |
| Criteria for the Occurrence of Nausea and Vomiting |    |    |
| No                                                 | 26 | 52 |
| Mild                                               | 22 | 44 |
| Moderate                                           | 2  | 4  |

**Table 2.** Bivariate Analysis (n=50)

| Fulfillment of preoperative fluid needs | Nausea Vomiting Incident |              |                  | Total    | p       | r     |
|-----------------------------------------|--------------------------|--------------|------------------|----------|---------|-------|
|                                         | No<br>n(%)               | Mild<br>n(%) | Moderate<br>n(%) |          |         |       |
| Over                                    | 2 (100)                  | 0 (0.0)      | 0 (0.0)          | 2 (100)  | <0.0001 | 0.826 |
| Moderate                                | 20 (100)                 | 0 (0.0)      | 0 (0.0)          | 20 (100) |         |       |
| Less                                    | 4 (14,2)                 | 22 (78.5)    | 2 (7.1)          | 28 (100) |         |       |
| Total                                   | 26 (52)                  | 22 (44)      | 2 (4)            | 50 (100) |         |       |

to vomit. Nausea and vomiting can occur immediately (2-6 hours after surgery) or later (more than 24-48 hours after surgery). Spinal anesthesia can cause vasodilation, leading to hypotension due to sympathetic block. The severity of hypotension increases with the level of the block. Hypotension results in hypoxemia and hypoperfusion in the chemoreceptor trigger zone (CTZ), which serves as the center of vomiting stimulation (Edwar et al. 2022). Nausea and vomiting are common symptoms associated with spinal anesthesia, with an incidence rate of approximately 25%. The main cause of nausea and vomiting in spinal anesthesia is hypotension (Soljak and Armstrong 2022).

The results of this study obtained a p-value of 0.00, indicating that  $p > 0.05$ . This means that the alternative hypothesis (H1) is accepted, and it can be concluded that there is a significant relationship between preoperative fluid requirements and the incidence of nausea and vomiting in patients undergoing post-spinal

anesthesia at the Anesthesia Installation. The strength of the relationship between the two variables was 0.826, falling into the category of perfect correlation. The relationship was positive, indicating that meeting preoperative fluid needs sufficiently can reduce the incidence of post-spinal nausea and vomiting in the Anesthesia Installation. The Spearman Rho test showed a correlation between the fulfillment of preoperative fluid needs and the incidence of nausea and vomiting in patients undergoing post-spinal anesthesia.

Respondents who had insufficient preoperative fluid requirements experienced the highest incidence of nausea and vomiting. These results align with the findings of Virgiani (2019). Considering current guidelines, literature, and daily clinical experience, comprehensive management of circulatory parameters is the first step to reduce the incidence of intraoperative and postoperative nausea and vomiting (IONV and PONV). This management includes liberal perioperative fluid



administration and the use of vasopressors when necessary. Additionally, using low-dose local anesthetics, intrathecal or spinal opioids, or hyperbaric solutions can help control neuraxial distribution and reduce maternal hypotension. However, this finding contradicts the research conducted by Sofiullah et al. (2022), which concluded that a continuous infusion of 5 mg/minute of ephedrine for the first 2 minutes followed by 1 mg/minute for the next 18 minutes immediately after spinal anesthesia is more effective in preventing nausea and vomiting compared to a 6% sterile HAES preload of 7.5 ml/kg body weight.

Nausea and vomiting are common symptoms associated with spinal anesthesia, with an incidence rate of approximately 25%. Spinal anesthesia can cause vasodilation, leading to hypotension due to sympathetic block. The severity of hypotension increases with the level of the block. Hypotension results in hypoxemia and hypoperfusion in the chemoreceptor trigger zone (CTZ), which serves as the center of vomiting stimulation (Edwar et al. 2022). According to Gan et al. (2019), meeting fluid needs adequately during fasting or anesthesia can reduce the risk of hypotension, which can result in nausea and vomiting.

The researchers assume that post-spinal anesthesia nausea and vomiting can occur due to sudden hypotension caused by vasodilation from spinal anesthesia. The main mechanism of hypotension after spinal anesthesia is sympathetic block, which causes arterial and venous vasodilation. Arterial vasodilation leads to a decrease in total peripheral resistance and systolic blood pressure. Venous vasodilation can cause severe hypotension due to decreased venous return and cardiac output. Adequate fluid requirements can reduce a significant decrease in cardiac output and the incidence of severe hypotension, thereby reducing the occurrence of nausea and vomiting.

Moreover, drastic hypotension can also occur due to rapid changes in position. Spinal anesthesia is usually performed in a sitting position, and immediately after the procedure, the respondent is placed in a horizontal supine position. The rapid administration of spinal drugs also plays a significant role in sudden hemodynamic changes. Additionally, achieving a high spinal block can increase the incidence of nausea and vomiting.

Furthermore, nausea and vomiting can be influenced by several factors, including the choice of anesthetic drugs, intraoperative

manipulations such as intestinal manipulation, and the psychological condition of the respondent. To reduce the occurrence of nausea and vomiting complications due to spinal anesthesia, management involves providing adequate fluid volume and administering antiemetic drugs such as ondansetron or metoclopramide.

In this study, there were respondents who did not experience nausea and vomiting despite having insufficient preoperative fluids. This could be attributed to maintaining a tilted or seated position for several minutes after spinal anesthesia, thus avoiding sudden position changes. The speed of entry of anesthetic drugs also significantly affects the incidence of nausea and vomiting. Slower drug administration during block achievement reduces the risk of severe hypotension, thereby decreasing the incidence of nausea and vomiting.

## CONCLUSIONS

There is a significant relationship between meeting preoperative fluid needs and the incidence of nausea and vomiting. The strength of the relationship between the two variables is a very strong correlation. The results of this study are expected to provide valuable information for instructing implementing nurses to pay attention to preoperative instructions from doctors and to provide accurate information to patients regarding the timing of fasting, enabling accurate calculation of patients' preoperative fluid needs. Additionally, it is hoped that there will be frequent socialization regarding preoperative patient preparation and informative sessions on fluid management and calculations.

## Declaration of Interest

*No conflict of interest*

## Acknowledgment

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*None*

## Data Availability

*The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.*

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# Relationship between the perception of employee rotation and nurse performance during the COVID-19 pandemic

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## ABSTRACT

**Background:** COVID-19 has had an impact on nurse exposure, including in the operating room. Nurse rotation is intended to minimize exposure to COVID-19. However, problems caused by nurse rotation might interfere with nurse performance due to the rapid adaptation required.

**Objective:** This study aims to determine the relationship between employee rotation and the performance of nurses during the COVID-19 pandemic.

**Methods:** An analytical descriptive cross-sectional study involving 45 nurses was conducted using purposive sampling technique. Data were collected using a job rotation questionnaire and a nurse performance questionnaire. The data were analyzed using the Spearman rho test with a significance level of 95%.

**Results:** Out of 45 respondents, 29 (64.4%) had a moderate perception of nurse rotation, and 28 (62.2%) demonstrated good nurse performance. There was no significant relationship found between nurse rotation and nurse performance ( $p > 0.05$ ).

**Conclusions:** It is recommended that nurses comply with the employee rotation policy to minimize contact with COVID-19 patients, reduce work stress, and enhance new competencies.

**Keywords:** nurse; nurse rotation; nurse performance; operating room; COVID-19

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## INTRODUCTION

The COVID-19 outbreak became a global pandemic after it was announced by the World Health Organization (WHO). With its rapid spread, COVID-19 became a major topic around the world. Indonesia is no exception, as the number of people infected with COVID-19 is increasing day by day (Somawati et al., 2020). The increase in COVID-19 cases affects all elements of society, including the economic, social, and health sectors. In the health sector, the effects are not only seen in the continuously increasing number of COVID-19 patients, but also in the impact on health workers and hospital service management (Supriatna, 2020). This has been demonstrated by Wang et al. (2020), who conducted a simulation at a hospital in America and showed an increase in working hours in the operating room, where each case required 10.5 to 11 hours.



## Nursing and Healthcare Practices

- *Nurse work rotation policies minimize COVID-19 exposure and reduce infection risk.*
- *Rotation prevents stress, burnout, and monotony while enhancing competencies.*
- *Pre-rotation socialization sessions prepare nurses mentally and physically for critical areas like operating rooms and emergency rooms.*

The operating room is a special unit in a hospital that functions as a place for performing elective or acute surgeries, requiring sterile conditions and other special considerations (Lundy et al., 2017). The operating room service is one of the key factors influencing the service quality indicators of a hospital. Therefore, the operating room must be designed with a high level of safety, as all actions taken in the operating room directly involve the patient's life (Manurung, 2020). Additionally, special management is required to ensure smooth operations and minimize unwanted events (Prasetyo et al., 2017). To improve the quality of operating room management, good cooperation is needed among the surgical team, which includes surgeons, operating room nurses, anesthesiologists, and other supporting personnel (Kurniawan et al., 2020).

Zheng et al. (2021) stated that nurses in operating rooms also treat patients with confirmed surgical indications for COVID-19. The risk of exposure to COVID-19 during surgical procedures is a significant stressor for nurses. Stress levels increase as the number of COVID-19 cases continues to rise. Nurses experience complex stress due to the increasing workload and concerns about their own health and the health of their families who may be exposed to COVID-19. Research conducted by Uğurlu et al. (2015) reported that 48.6% of operating room nurses experienced severe stress, 43.2% experienced stress, 6.8% experienced mild stress, and 1.4% did not experience stress. Simonetti et al. (2021) stated that healthcare workers are at risk of experiencing psychological disorders while

treating COVID-19 patients. The results showed that 50.4% of respondents had symptoms of depression, and 44.6% had symptoms of anxiety related to feeling depressed. Job rotation can be one way to reduce burnout in hospitals (Pinhatti et al., 2017).

Nurse rotation is a system aimed at nurses, involving internal transfers or rotations within the nursing field according to established procedures. The purpose of rotation is to alleviate nurses' boredom, increase motivation and morale, and fulfill employees' interests and work fields. Apart from benefiting nurses, rotation also provides advantages for hospitals facing labor issues. Implementing a rotation program enables more efficient and flexible management of manpower shortages (Nursalam et al., 2018).

Prior to the COVID-19 pandemic, work rotation was conducted periodically, transferring nurses from the emergency operating room to the central operating room every 4 months. However, since the pandemic, a new incovid operating room unit was established specifically for surgical cases in patients with suspected or confirmed COVID-19. As a result, the rotation coverage expanded to three units, and the rotation period shortened to every two months. Furthermore, treating surgical patients with confirmed COVID-19 requires the use of level 3 personal protective equipment and longer operating times. This situation has led to an increased workload, which poses risks of stress, fatigue, and decreased immunity.

The performance of nurses is greatly influenced by their own efforts. Julianto & Soelarto (2016) stated that the need for achievement is a key motivator and contributor to job satisfaction. Additionally, environmental factors also play a crucial role in determining nurses' performance. These factors include communication of development potential and individual policies (Nursalam et al., 2018). The presence of individual policies, such as employee rotation conducted routinely, leads to changes in the external conditions of the work environment and the social environment of nurses. These changes are suspected to be among the factors related to nurses' performance during the rotation process in the operating room amid the COVID-19 pandemic.

## METHODS

### Design



**Table 1.** Respondents Characteristics (n=45).

| Characteristics              | n  | %    |
|------------------------------|----|------|
| Age                          |    |      |
| Early Adult (26-35 Years)    | 30 | 66.7 |
| Late Adults (36-45 Years)    | 15 | 33.3 |
| Gender                       |    |      |
| Man                          | 23 | 51.1 |
| Woman                        | 22 | 48.9 |
| Education                    |    |      |
| DIII Nursing                 | 31 | 68.9 |
| Professional Nursing (Ners)  | 14 | 31.1 |
| Operation Room               |    |      |
| Central Operating Room       | 42 | 93.3 |
| Emergency Operating Room     | 3  | 6.7  |
| Length of work               |    |      |
| 1-3 Years                    | 3  | 6.7  |
| > 3 Years                    | 42 | 93.3 |
| Employee Status              |    |      |
| BLUD contract                | 33 | 73.3 |
| Civil Servant                | 12 | 26.7 |
| Employee Rotation Perception |    |      |
| Less                         | 12 | 26.7 |
| Moderate                     | 29 | 64.4 |
| Good                         | 4  | 8.9  |
| Nurse Performance            |    |      |
| Less                         | 0  | 0    |
| Moderate                     | 17 | 37.8 |
| Good                         | 28 | 62.2 |

**Table 2.** The correlation of employee rotation perception with nurse performance.

| Employee Rotation Perception | Nausea Vomiting Incident |                  |              | Total     | p     |
|------------------------------|--------------------------|------------------|--------------|-----------|-------|
|                              | Less<br>n(%)             | Moderate<br>n(%) | Good<br>n(%) |           |       |
| Less                         | 0 (0)                    | 5 (11.1)         | 7 (15.6)     | 12 (26.7) | 0.296 |
| Moderate                     | 0 (0)                    | 12 (26.7)        | 17 (37.8)    | 29 (64.4) |       |
| Good                         | 0 (0)                    | 0 (0)            | 4 (8.9)      | 4 (8.9)   |       |
| Total                        | 0 (0)                    | 17 (37.8)        | 28 (62.2)    | 45 (100)  |       |

The research design employed in this study was descriptive analytic correlation with a cross-sectional approach.

### Sample and Setting

The population for this study comprised all operating room nurses at Dr. Saiful Anwar Malang Hospital. The population size

consisted of 85 nurses, including 24 nurses in the emergency operating room, 45 nurses in the central operating room, and 16 nurses in the Incovid operating room. The sampling technique used was purposive sampling. The sample size consisted of 45 respondents selected based on specific criteria. The inclusion criteria were as follows: (1) nurses working in

the operating room, (2) with more than 1 year of work experience, (3) willing to participate as respondents, (4) not currently sick, on leave, or engaged in studying assignments, (5) non-comorbid, and (6) underwent work rotation during the period of January-June 2021. The exclusion criteria were: (1) nurses with comorbidities or contraindications preventing them from being rotated to the COVID-19 operating room, (2) unwillingness to participate as respondents, and (3) on leave or sick.

## Instruments

The employee rotation perception questionnaire was adapted from a previous study by Munawaroh (2016). The calculation of the  $r$  value for the 10 question items yielded a value greater than 0.05, indicating that all items were considered valid. The Cronbach's alpha value was also greater than 0.60, indicating reliability for measurement. The nurse performance questionnaire was adopted from a previous questionnaire by Ayatulloh et al. (2021). The calculation of the  $r$  value for the 14 question items yielded a value greater than 0.05, indicating that all items were considered valid. The Cronbach's alpha value was also greater than 0.84, indicating reliability for measurement.

## Data Collection

The research was conducted over a period of four weeks in September 2021. The researchers selected respondents who met the inclusion and exclusion criteria. The data collection process did not involve enumerators, and respondents who met the research criteria were asked to sign a research informed consent form as a form of consent. The researchers distributed the job rotation and nurse performance questionnaires to the prepared respondents. After the data had been collected, data analysis was conducted.

## Data Analysis

The statistical test used in this research was the Pearson Product Moment correlation test. The level of significance was set at 95% or  $\alpha = 0.05$ . Additionally, the strength of the relationship was assessed by examining the  $r$  value obtained from the statistical analysis.

## Ethical Consideration

This research underwent an ethical review at Dr. Saiful Anwar Hospital, Malang. Information that passed the ethical review received

an ethical approval letter with the number 400/206/K.3/302/2021.

## RESULTS

Based on table 1, it is evident that out of the 45 respondents, the majority of them fall into the early adult category (66.7%), are male (51.1%), have completed their last education at the DIII Nursing level (68.9%), work in IBS (93.3%), have a length of service exceeding 3 years (93.3%), and have the status of a BLUD contract employee (73.3%). More than half of participants, specifically 29 respondents or 64.4%, have a perception of employee rotation in the moderate category. Additionally, regarding nurse performance level, more than half of the respondents, namely 28 respondents or 62.2%, demonstrated a good level of nurse performance.

Based on table 2, it is evident that out of 45 respondents, the majority of them, specifically 17 respondents or 37.8%, had a moderate perception of employee rotation and indicated that the nurse's performance in the Operating Room was good. The Spearman Rho statistical test yielded a  $p$ -value of 0.296, which is greater than 0.05. Consequently,  $H_1$  is rejected, suggesting that there is no significant relationship between perceptions of employee rotation and nurse performance in the Operating Room.

## DISCUSSION

More than half of the nurses perceive employee rotation in the moderate category. The researchers believe that many operating room nurses find job rotation beneficial, which aligns with the results of the research questionnaires filled out by the respondents. The majority of respondents agree that the current job rotation implemented by the hospital can reduce work-related stress and improve workloads and tasks. This aligns with Nursalam et al. (2018), who suggest that rotation enhances employee expertise, provides an overview of job satisfaction diversity, eliminates task-related stressors, and fosters employee development and confidence in management's attention to self-development.

The researcher argues that the positive response to the work rotation system may be influenced by the rotational basis used in the Operating Room. Further research reveals that the basic work rotation in the Operating Room is based on a merit system, taking into account

scientific, objective, and work performance results. This rotation system recognizes and appreciates nurses' achievements, including work productivity, morale, discipline, and the rate of work accidents. The existence of a competency assessment/credentialing process further supports the mapping of nurses' expertise levels on a regular basis.

A significant number of respondents (28 out of 45) in the study demonstrate good nurse performance in the operating room. The researcher attributes this high performance to the respondents' educational background and years of service. All respondents have completed formal education, with a minimum of a DIII Nursing degree, and a considerable portion of them (14 out of 45) have completed professional education in nursing. This indicates that the respondents' cognitive abilities in providing nursing knowledge contribute to their strong performance in their daily practice in hospitals.

This finding is in line with research conducted by Kirkpatrick et al. (2019), suggesting a relationship between the level of education and nurses' performance. Additionally, a majority of respondents in the study have more than three years of work experience, with 42 respondents (93.3%) falling into this category. This number is significantly higher compared to the average private hospital, which typically has a lower number of nurses with a tenure of more than three years. Nurses with extensive work experience bring valuable skills and expertise to their performance, thus positively contributing to their overall performance in the field.

The researcher argues that tenure can affect the performance of nurses, as longer tenure provides more experience in completing work, ultimately improving performance. This aligns with the theory put forward by Mangkuprawira, which suggests that work experience allows individuals to learn and behave better, utilizing past experience as feedback to enhance the quality of their work. It is also consistent with the theory of Ivancevich, J, M, which states that an employee's past work experience in the same job serves as a good indicator of future performance (Ivancevich et al., 2018).

The absence of a significant relationship between job rotation and nurse performance indicates that nurse performance during the COVID-19 pandemic has reached an adequate level of skill. Direct job rotation does not negatively impact nurse performance.

Work rotation in the operating room follows a temporary rotation approach, specifically designed for short-term rotation needs (Pinhatti et al., 2017). This does not greatly affect employee performance during the periodic rotation process. Considering the COVID-19 pandemic, it is important to calculate the possible need for a "covering shift" due to sick or absent workers and ensure adequate staff. Maximizing rest opportunities during work shifts (e.g., breaks every 1-2 hours) is recommended, especially in high-risk environments where medical personnel must wear coveralls throughout the shift. Reducing the shift duration to 6 hours (4 shifts per day) is also suggested (Fischer et al., 2017). Given the significant impact on health workers during the COVID-19 pandemic, changes in rotation and work duration should be considered to reduce exposure to the virus and maintain the physical and mental health of medical personnel. This includes monitoring the health status of medical personnel. Currently, there are no specific working hour guidelines for health workers treating COVID-19 patients (Walton et al., 2020).

The absence of a significant relationship indicates that job rotation does not have a significant effect on the effectiveness and productivity of nurses, and the performance of the nurses in this study has not changed significantly. The researcher further argues that based on the questionnaire results, some respondents perceive that nurse rotation does not greatly reduce feelings of boredom and anxiety, primarily due to a lack of communication between nursing fields and implementing nurses. Insufficient communication regarding employee rotation policies, socialization, and reasons for measuring the performance of rotated nurses contributes to this perception (Friday et al., 2015). Clear communication regarding the expected skills from the rotation process should be conveyed, and the nursing field should pay attention to nurses' wishes based on their abilities. The researcher assumes that rotation is not conducted for employees in the late stages of their careers, which hinders their development in new positions. Nurses feel that rotation does not present new challenges or variations in their work and responsibilities compared to their previous roles, limiting opportunities for personal development (Pinhatti et al., 2017).

The researchers' opinion is that nurse rotation can benefit performance if it is

balanced with guidance, especially for nurses transitioning to different tasks, such as moving from the operating room to the COVID-19 operating room. Continual adjustment to a new environment requires appropriate training to ensure nurses perceive rotation as beneficial rather than increasing their workload (Munawaroh, 2016). Increased workload can lead to stress and have a negative impact on optimal performance (Nursalam et al., 2018).

## Limitations

This study has limitations regarding the minimum duration for collecting research data related to reducing COVID-19 exposure. It is possible that there are statements in the questionnaire that were not well understood by respondents. However, due to time constraints, this was not properly addressed during the data collection process.

## CONCLUSION

Based on the results of the study, it is recommended for nurses to adhere to the work rotation policy due to its benefits in minimizing contact with COVID-19 patients, reducing work stress, and enhancing new competencies. Hospitals, through their human resource management (HR), are encouraged to conduct planned socialization sessions prior to rotating nurses in the central operating room and the emergency room. This will help prepare nurses mentally and physically before they begin working in a new operating area.

## Declaration of Interest

None

## Acknowledgment

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## Data Availability

*The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.*

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# Examining the motivation and the implementation of early mobilization in post-lower extremity operations

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## ABSTRACT

**Background:** Early mobilization is an effective approach for the healing process following lower extremity surgery. However, its successful implementation requires self-encouragement and motivation from patients.

**Objective:** This study aimed to investigate the relationship between motivation and the implementation of early mobilization in patients undergoing lower extremity surgery.

**Methods:** A cross-sectional analytic descriptive study was conducted involving 41 respondents who were selected using a purposive sampling technique. Data were collected through motivation questionnaires and early mobilization observation sheets. The collected data were analyzed using the Spearman Rho test with a significance level of  $\alpha = 0.05$ .

**Results:** Out of the 41 respondents, 21 (51.2%) showed moderate levels of motivation for early mobilization, while 20 (48.8%) demonstrated sufficient to good implementation of early mobilization. The statistical test revealed a significant relationship between motivation and early mobilization ( $p=0.035$  or  $p<0.05$ ), with an  $r$  value of 0.329.

**Conclusions:** The results highlight a significant correlation between motivation and early mobilization, which is closely associated with psychological mechanisms. The need for quick recovery serves as an encouragement for optimal early mobilization. Higher motivation levels contribute to better implementation of early mobilization. Considering the importance of motivational variables, it is suggested that nurses increase educational exposure and involve the patient's family in order to enhance motivation for early mobilization.

**Keywords:** motivation; early mobilization; post surgery; lower extremity

## INTRODUCTION

Fracture, also known as a broken bone, occurs when the normal continuity of bone tissue is disrupted (Yasmara et al., 2016). Fractures can happen in any part of the bone, including the upper and lower extremities. They can be caused by various accidents, such as work accidents, traffic accidents, falls, or physical exertion. The cause of a fracture depends on the type and extent of the injury (Sani et al., 2020).

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## Nursing and Healthcare Practices

- 51.2% of the surveyed nurses showed moderate levels of motivation for early mobilization.
- 48.8% of the surveyed nurses demonstrated sufficient to good implementation of early mobilization.
- The study revealed a significant relationship between motivation and early mobilization, with higher motivation levels contributing to better implementation.

In 2016, the World Health Organization (WHO) reported that over 5.6 million people died as a result of traffic accidents, and 1.3 million people suffered from fractures. Accidents have a relatively high prevalence, with lower extremity fractures accounting for 40% of these incidents (Jusuf et al., 2017). According to the Basic Health Research conducted by the Agency for Health Research and Development in 2018, Indonesia recorded a fracture incidence of 5.5%. Moreover, injuries to the lower extremities have the highest prevalence, representing 67.9% of all injuries, and in East Java, the prevalence rate is 64.5% (Kemenkes RI, 2018).

Orthopedic surgery is an approach used to restore fractures to their original shape (Syamsuhidayat, 2016). One specific type of orthopedic surgery that can be performed is open reduction using internal fixation (ORIF). The goal of this surgery is to maintain the position of the bone fragments until bone healing takes place (Smeltzer et al., 2014). Following the surgery, it is crucial for a nurse to implement an early mobilization plan for the patient. However, in some cases, the nurse may only encourage the patient to move the operated limb. Due to a lack of understanding regarding the importance of mobilization, patients may experience fear, which can lead to joint stiffness, tingling, swelling, pain, and paleness in the operated limb (Anggraeni, 2018).

The phenomenon observed by researchers in the field is the varying levels of implementation of early mobilization in post-lower extremity surgery patients, despite receiving information from healthcare workers with equal intensity. To

investigate the factors that may contribute to this difference, researchers conducted a series of preliminary studies. During the interview, it was revealed that nurses consistently provided information to patients undergoing surgery about activities to be performed before and after the surgery, particularly regarding early mobilization for postoperative lower extremity patients. The head of the department emphasized the importance of motivating patients to move their limbs, such as legs and arms, and engage in activities like tilting the body to the right and left within 6-12 hours after surgery. The preliminary study involved 10 postoperative lower extremity patients who had undergone general anesthesia. Out of these, 4 patients (40%) reported being trained to move their hands and feet and lie down on their sides within 6 hours after surgery. However, the remaining 6 patients (60%) had not received training to move their hands and feet within the same timeframe.

Based on the aforementioned information, the authors of this study are interested in exploring the relationship between motivation and the implementation of early mobilization in post-lower extremity surgery patients. The aim of the study is to assess the level of motivation among respondents regarding the implementation of early mobilization and to determine whether early mobilization can expedite the healing process for post-lower extremity surgery patients.

## METHODS

### Design

The research design employed in this study was a descriptive analytic method with a cross-sectional design.

### Sample and Setting

The population for this study consisted of all postoperative lower extremity patients at IRNA (called as ward) II Surgery RSUD Dr. Saiful Anwar Malang. The inclusion criteria were as follows: (1) Patients aged between 17 and 50 years, (2) Postoperative patients with lower extremity surgeries, (3) Stable condition with normal vital signs, and (4) Willingness to participate in the study. The exclusion criteria were: (1) Postoperative lower extremity patients experiencing severe pain with a pain score ranging from 7 to 10, and (2) Postoperative lower extremity patients who were unable

to read or write. The number of patients in the last two months of January 2021 was 30, and there were 15 patients in February 2021. Therefore, the total number of postoperative lower extremity patients treated over the course of two months was 45. The sample size for this study was determined using the Slovin formula, resulting in a required sample size of 41 respondents. The sampling technique employed in this study was purposive sampling technique.

## Data Collection

The researchers conducted natural observations of early mobilization. The observation process took place from the day after the motivation questionnaire was completed until the second day after surgery. In addition to the researchers, three nurses from IRNA II Surgery were also involved as enumerators to assist in collecting research data. These enumerators were selected from primary nurses serving in the same unit. Their role was crucial in collecting data, particularly considering the limitations posed by the COVID-19 pandemic. Due to the pandemic conditions, the data collection process was significantly restricted, including limited face-to-face interactions and supervision duration, especially during the observation of early mobilization in postoperative lower extremity patients.

## Data Analysis

The statistical test used in this study was the Spearman's rank correlation test. This test was chosen because the research design focused on investigating the correlation between motivation and the implementation of early mobilization. Furthermore, the data were collected on an ordinal scale, making the Spearman's rank correlation test highly suitable for analysis. The level of significance was set at 95% or  $\alpha = 0.05$ .

## Ethical Consideration

This research underwent an ethical review at Dr. Saiful Anwar Hospital in Malang. The study obtained ethical approval with the reference number 400/161/K.3/302/2021.

## RESULTS

General data on the characteristics of the respondents found that most of them were in the early elderly category (34.1%), male (70.7%),

high school education background (48.8%), underwent ORIF surgery (61%), and almost all of them never had a history of previous surgery (97.6%) (Table 1).

Based on table 2, it is known that 21 respondents (51.2%) have a moderate category of motivation and 20 respondents or 48.8% carried out early mobilization in the sufficient and good categories. The following table presents a cross tabulation between motivation and the implementation of early mobilization.

Based on table 3, it is known that of the 21 respondents who have moderate motivation, 13 respondents (62.0%) have the implementation of early mobilization in the sufficient category. Meanwhile, of the 20 respondents who have a high category of motivation, 13 of them (65.0%) have the implementation of early mobilization in the good category. The results of the Spearman's rank correlation test showed a p-value of 0.035, which is less than 0.05 ( $p < 0.05$ ). This indicates that the alternative hypothesis (H1) is accepted and the null hypothesis (H0) is rejected. Therefore, it can be interpreted that there is a relationship between the level of motivation and the implementation of early mobilization in post lower extremity surgery patients. The correlation coefficient obtained from the Spearman's rank correlation test was  $r = 0.314$ . This value suggests a weak relationship between motivation and the implementation of early mobilization. The positive correlation coefficient indicates that the level of motivation and the implementation of early mobilization are directly proportional. In other words, as the level of motivation increases, the implementation of early mobilization by post lower extremity surgery patients improves.

## DISCUSSION

Based on the study's results, it is evident that more than half of the respondents had a moderate level of motivation for early mobilization. None of the respondents fell into the category of low motivation. These findings indicate that the overall level of motivation among all respondents was good, with the majority exhibiting moderate to high levels of motivation.

The researcher believes that the high level of motivation among respondents to engage in early mobilization is driven by the factor of need. This is supported by data from the motivational questionnaire, where the majority of respondents agreed that early mobilization

**Table 1.** Respondents Demographic Characteristics (n=41).

| Characteristics   | Category                         | n  | %    |
|-------------------|----------------------------------|----|------|
| Age               | Late Teenagers (17-25 Year)      | 8  | 19.5 |
|                   | Early Adult (26-35 Year)         | 10 | 24.4 |
|                   | Late Adult (36-45 Year)          | 9  | 22.0 |
|                   | Early Elderly (46-55 Year)       | 14 | 34.1 |
| Gender            | Man                              | 29 | 70.7 |
|                   | Woman                            | 12 | 29.3 |
| Education         | Elementary School                | 6  | 14.6 |
|                   | Junior high school               | 15 | 36.6 |
|                   | Senior High School               | 20 | 48.8 |
| Operation Type    | Open reduction internal fixation | 25 | 61.0 |
|                   | Posterior-stabilized             | 12 | 19.5 |
|                   | Open reduction external fixation | 1  | 2.4  |
|                   | Interlocking Nail                | 1  | 2.4  |
|                   | Intermedial Nail                 | 1  | 2.4  |
|                   | Tension band wiring              | 1  | 2.4  |
| Operation History | Never                            | 40 | 97.6 |
|                   | Once                             | 1  | 2.4  |

**Table 2.** Respondents' Level of Motivation and Early Mobilization (n=41).

| Characteristics                      | Category | n  | %    |
|--------------------------------------|----------|----|------|
| Motivation<br>Early Mobilization     | Low      | 0  | 0    |
|                                      | Moderate | 21 | 51.2 |
|                                      | High     | 20 | 48.8 |
| Implementation<br>Early Mobilization | Low      | 1  | 2.4  |
|                                      | Moderate | 20 | 48.8 |
|                                      | High     | 20 | 48.8 |

**Table 3.** Cross Tabulation and Spearman Rho's Analysis between Motivation and the Implementation of Early Mobilization.

| Motivation | Implementation Early Mobilization |            |            | Total     | p     | r     |
|------------|-----------------------------------|------------|------------|-----------|-------|-------|
|            | Low                               | Moderate   | High       |           |       |       |
| Low        | 0 (0%)                            | 0 (0%)     | 0 (0%)     | 0 (0%)    | 0.035 | 0.314 |
| Moderate   | 1 (4.7%)                          | 13 (62.0%) | 7 (33.3%)  | 21 (100%) |       |       |
| High       | 0 (0%)                            | 7 (35.0%)  | 13 (65.0%) | 20 (100%) |       |       |

would facilitate a quick recovery and enable them to regain their activity levels. Respondents firmly believed that early mobilization would expedite the healing process. This viewpoint reinforces the idea that the respondents' primary need after lower extremity surgery is to swiftly regain health through early mobilization exercises.

This perspective aligns with the theory presented by [Suryadi & Efendi \(2019\)](#), which

suggests that one of the intrinsic factors influencing motivation is the factor of need. Individuals engage in activities or actions due to both biological and psychological needs. For instance, patients engage in early mobilization because they desire a speedy recovery after surgery. Additionally, apart from the need factor, the researcher also believes that other factors contributing to the high motivation among respondents are the



encouragement they receive from their families and healthcare providers. This is supported by the questionnaire responses, as the majority of respondents agreed that their families accompanied and supported them during early mobilization. Families played a crucial role in motivating patients to engage in early mobilization. Similarly, respondents stated that healthcare workers (nurses) motivated them to perform early mobilization by explaining the benefits of such exercises. Families play a vital role in motivating respondents to engage in early mobilization.

The researcher associates the encouragement from healthcare workers with the Standard Operating Procedure (SOP) on information communication and education received by respondents before surgery. According to the procedure at Dr. Saiful Anwar Hospital in Malang, every respondent scheduled for surgery receives information about early mobilization from healthcare workers. This information serves as a foundation to build the motivation of respondents following lower extremity surgery. This viewpoint aligns with the perspective of Yasmara et al. (2016) that understanding mobilization movements requires not only knowledge of physiological movements but also an understanding of movement regulation by the musculoskeletal and nervous systems. Individuals around the patient, such as family members or caregivers, need to know how to apply these principles in a clinical setting to determine the safest way to move the patient and understand the effects of immobilization on physiological, psychosocial, and developmental aspects of patient care. Early mobilization plays a significant role in reducing pain by diverting the patient's focus away from the location of pain or the surgical area, reducing the activation of chemical mediators in the inflammatory process that heighten pain response, and minimizing pain transmission to the central nervous system. Through these mechanisms, early mobilization proves effective in reducing postoperative pain intensity (Wulandari & Anindari, 2018).

Based on the study results, it was found that nearly half of the respondents implemented early mobilization in the sufficient and good categories. Only one respondent fell into the less category. The questionnaire responses regarding the implementation of early mobilization indicated that the aspects of the first, second, third, sixth, and seventh stages were adequately carried out. The majority of

respondents showed good implementation at these stages. In the first stage, the respondents were able to demonstrate adequate breathing exercises on both the first and second days. The implementation of lying on the right side, left side, and upper limb joint range of motion did not encounter any issues (Kurillo et al., 2012). Additionally, the respondents displayed good ability in transitioning from supine to semi-sitting positions and sitting for approximately five minutes while practicing deep breathing. These stages were optimally carried out by the majority of the main respondents on the second day after surgery.

The researcher believes that the number of respondents demonstrating good implementation of early mobilization is due to the relatively easy movements involved. In stages one to three, the respondents did not encounter significant difficulties with breathing exercises, tilting movements, or upper extremity joint range of motion. These were relatively light and easy movements to perform. Similarly, the movements involved in transitioning from supine to sitting positions did not require a high tolerance for range of motion and did not cause significant pain. The implementation of early mobilization at these stages is indeed straightforward for patients after lower extremity surgery (Schweickert & Kress, 2011). Essentially, the patients only encountered issues with their lower extremities, while the movements focused on the upper extremities and breathing exercises that did not require much involvement of the lower extremities.

This is consistent with the theory presented by Smeltzer et al. (2014), which suggests that postoperative lower extremity patients experience limited activity due to severe pain caused by nerve friction in the fractured or operated area. This aligns with the research conducted by Andri et al. (2020) on postoperative lower extremity fracture patients at Dr. M Yunus Bengkulu, where respondents tended to exhibit limited characteristics, such as difficulty changing body positions and limited range of motion in the lower extremity joints.

The researcher believes that one respondent still faced challenges in mobilizing properly due to fear of experiencing pain during early mobilization. Patients often worry that certain body positions after surgery may affect the healing process of the surgical wound. However, this concern is not entirely warranted, as almost all types of surgeries require early mobilization or body movement



as part of the recovery process (Karyati et al., 2018). Therefore, complications that arise after surgery need to be addressed attentively, as some complications can prolong the patient's hospital stay and increase treatment costs (Corwin, 2014).

The aforementioned conditions likely arise from respondents' lack of understanding regarding the permission to mobilize after surgery and the specific types of mobilization they can perform. Consequently, respondents often feel afraid to move, despite receiving advice to mobilize. They fear re-injury, wound reopening, or stitches coming undone, and therefore choose to avoid mobilization, resulting in prolonged hospital stays due to delayed wound healing (Frykberg & Banks, 2015; Gouin & Kiecolt-Glaser, 2011). This situation can be prevented if nurses can provide assurance to patients that movement, within therapeutic limits, is highly beneficial. Assurances of nurse assistance, pain control, and achievement of activity goals can help alleviate discomfort and improve patient motivation (Barr & Tsai, 2021).

We discovered a significant relationship between the level of motivation and the implementation of early mobilization in patients who underwent lower extremity surgery. The researcher believes that this relationship is driven by psychological mechanisms. The main advantage of motivation for early mobilization is that it creates a sense of passion and the desire to engage in it independently. When something is done with motivation, the respondent feels happy to do it (Alaparthi et al., 2020). Respondents made an effort to exercise as much as possible due to their eagerness to achieve their healing targets. The research findings support this view, as the majority of highly motivated individuals also demonstrated good early mobilization. This aligns with the theory proposed by Hasibuan, M. (2017), which highlights the benefits of motivation in fostering work passion and increasing productivity. Motivated individuals tend to complete their work according to the appropriate standards and within the specified timeframe because they find value in their work and are driven to achieve their goals.

The results of the Spearman's rank correlation test yielded a correlation coefficient value of  $r = 0.314$ . This value indicates a weak relationship between motivation and the implementation of early mobilization. The weak level of correlation suggests that other factors may be more dominant in influencing

the implementation of early mobilization after lower extremity surgery. Factors such as encouragement from healthcare workers, family participation, and various external factors can contribute to the implementation of early mobilization (Najjar et al., 2022; Zhang et al., 2022). However, the positive correlation coefficient indicates that there is a direct proportional relationship between motivation and the implementation of early mobilization. In other words, as the level of motivation increases, the quality of early mobilization efforts by postoperative patients in the lower extremity improved.

The researcher argues that there is a weak positive correlation specific to the type of motivation. The type of motivation examined in this study is positive motivation, specifically the desire for faster recovery after lower extremity surgery. This positive motivation fosters a synergistic attitude towards engaging in early mobilization (Hodgson et al., 2018). Consequently, the more encouragement the respondents receive regarding their recovery, the better their efforts towards early mobilization will be. This viewpoint aligns with the research conducted by Priansa & Suwatno (2018), which distinguishes between positive motivation and negative motivation. Positive motivation, or positive incentives, motivates individuals through positive encouragement. Motivated individuals are driven by the anticipation of favorable rewards. In the context of early mobilization, a desirable reward is faster postoperative recovery. This perspective is further supported by the findings of Arse (2017), which indicate that stronger motivation leads to faster goal achievement and greater satisfaction. Motivation serves as a driving force for patient behavior directed towards attaining specific goals in the healing process (Notoatmodjo, 2013). Additionally, Listautin (2019) demonstrated the influence of motivation on early mobilization behavior in postoperative patients.

## CONCLUSION

The conclusion of this study is that there is a significant relationship between motivation and the implementation of early mobilization of post-lower extremity surgery patients. Based on the results of the study, it is known that the nurse's role is very large in providing external motivation for postoperative lower extremity patients. This allows nurses to continue to

improve education, encouragement, and supervision of patients in order to maximize the implementation of early postoperative lower extremity mobilization. In addition, the results of the study have also illustrated that the role of the family is still minimal in the role of the patient's support system, nurses should take part in providing direction to the patient's family to actively encourage the creation of a family who is present in every stage of recovery for post-lower extremity surgery patients. Hospitals can continue to develop promotive and educative efforts to encourage internal and external motivation of patients. Hospitals can play a role in providing support through nurses in order to achieve the target of increasing the implementation of early mobilization of patients after lower extremity surgery. Follow-up research with experimental models was conducted to identify various interventions that can increase patient motivation in increasing awareness of the implementation of early mobilization in patients with lower extremity surgery.

### Declaration of Interest

None

### Acknowledgment

*I would like to thank to the respondents who participated in the study.*

### Funding

None

### Data Availability

*The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.*

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# Pain management in postoperative bone fracture patients: A systematic scoping review

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## ABSTRACT

**Background:** A fracture is a condition in which the continuity of bone tissue is broken, causing stress and pain during the healing process. Therefore, the management of pain in postoperative bone fracture patients should be addressed..

**Objective:** The aim is to identify interventions for managing pain in patients with postoperative bone fractures.

**Design:** A systematic scoping review.

**Data Sources:** The search process was conducted from March 8 to March 15, 2022, using the following databases: PubMed, CINAHL, and Science Direct.

**Review Methods:** PRISMA flowcharts were used for the systematic review. Articles published in the last five years (2018-2022) were included, focusing on full-text articles, randomized controlled trials (RCTs), and cohort studies that discussed the topic of postoperative pain management in fracture patients. The search yielded a total of 4,324 articles from the four databases. After screening by year, 819 articles were obtained. Based on the full text and abstracts of 432 articles, and applying exclusion and inclusion criteria, five articles were selected.

**Results:** The five articles demonstrated that pain management in postoperative bone fracture patients can be achieved through various pharmacological approaches, including peripheral nerve block anesthesia, antioxidants (vitamin C), intravenous tranexamic acid, intravenous dexamethasone, and the use of calculators and comprehensive pain plans as management tools.

**Conclusions:** This study recommends that healthcare professionals apply and further develop the findings as a pain management strategy for postoperative bone fracture patients.

**Keywords:** bone fracture; pain intervention; pain management; post-operative

## INTRODUCTION

Fracture is a condition where the continuity of bone tissue is broken, causing stress on the bone (Purwanto, 2016). According to Santos et al. (2018), fractures are severe injuries that can extensively affect soft tissue and bone, resulting in trauma such as vulnus, bleeding, bruising, stretching, partial tears, blood vessel disorders, and nerve disorders. Fractures require a long



## Nursing and Healthcare Practices

- Nurses administer pharmacological approaches like peripheral nerve block anesthesia, vitamin C antioxidants, and intravenous medications (tranexamic acid, dexamethasone) for pain management in postoperative bone fracture patients.
- Nurses employ calculators and comprehensive pain plans as effective tools for managing pain in postoperative bone fracture patients.
- The study highlights the need for healthcare professionals, including nurses, to adopt and advance these strategies for effective pain management in postoperative bone fracture patients.

healing process.

Globally, the prevalence of injury-related deaths is 4.4 million, with 3.16 million attributed to accidents, 1.25 million to violence, 1 in 3 due to traffic accidents, 1 in 6 due to suicide, 1 in 10 due to homicide, and 1 in 61 due to war and conflict. Falls account for over 684,000 deaths each year, along with temporary or permanent disabilities. Approximately 90% of injury-related deaths occur in low- and middle-income countries (WHO, 2021). According to the Basic Health Research 2018 in Indonesia, there has been an increase in fracture cases up to the year 2018. The highest prevalence of injuries is on the lower extremities at 67.9%, while the upper extremities account for 32.7% (Ministry of Health RI, 2018).

Fracture patients face various problems, with postoperative pain being one of the most common. Therefore, fracture patients require measures for pain management (Mahartha et al., 2017). Several methods, both pharmacological and non-pharmacological, have been proposed, but not all of them effectively treat pain in postoperative fracture patients. This indicates a need for further development in pain management methods to alleviate the severity of pain in postoperative fracture patients (Imani et al., 2019).

Regarding pain management in fracture patients who have undergone frequent

surgeries, only drugs are used (McDonald et al., 2020). Aligning with the research of Luo et al. (2018), management of chronic pain solely relies on pharmacological approaches, including the administration of celecoxib, transdermal buprenorphine, and codeine with added ibuprofen. A study by Elsevier & Cannada (2020) demonstrated that hematoma blocks can effectively reduce pain in patients with bone fractures, surpassing systemic analgesics in pain management for clients with hip fractures. The purpose of this research is to identify interventions that can be implemented for pain management in postoperative fracture patients.

## METHODS

### Design

A systematic scoping review was utilized for this study.

### Search Methods

The search for articles was conducted using PRISMA flowcharts for systematic review research (Figure 1). The databases used were PubMed, CINAHL, and ScienceDirect, focusing on articles published in the last five years (2018-2022). The terms used in this study included "intervention," "strategies," "treatment," "program," "management," "pain management," "pain control," "managing pain," "postoperative," "post-operative," "postoperative," "post-surgery," "open fracture," "fractures," and "open fracture injuries."

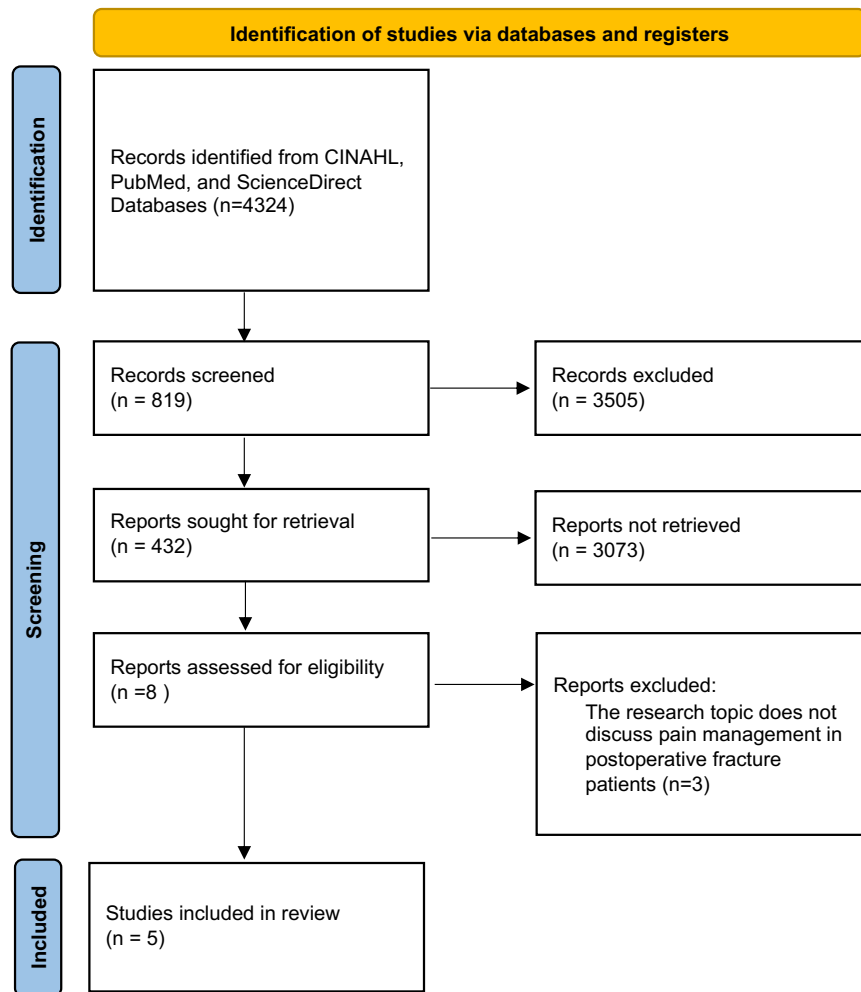
### Eligibility Criteria

The inclusion criteria for this scoping review included full-text articles, randomized controlled trial (RCT) designs, cohort studies, and articles discussing pain management in patients with postoperative fractures. Articles not written in English were excluded. Seven researchers (UR, SP, AMM, HAD, SN, YFF, and RA) independently conducted the article search process, screened articles, and compiled the results for the scoping review.

### Data Charting

Data charting involved comprehensive analysis of the selected articles. The extracted data was then presented in a scoping review results table, which included information such as title, author, year of publication, location, study design, population, intervention, pain





**Figure 1. PRISMA Diagram**

scale, and research results. The results of the data extraction were further elaborated in the discussion section.

### Quality Appraisal

The quality of the studies was assessed using the critical appraisal checklist tools provided by the Joanna Briggs Institute (JBI) for research with RCT and cohort study designs. The tool for RCTs consisted of 13 consistent assessment questions, while the tool for cohort studies had 11 consistent assessment questions, covering four categories: yes, no, unclear, and not applicable. "Yes" was assigned a value of 1, "no" a value of 0, and the total score ranged from 0 to 9 (Table 1).

### RESULTS

The article search yielded a total of 4,324 articles based on the keywords used, obtained from PubMed, CINAHL, and ScienceDirect.

After screening by year, 819 articles were identified. From the full text and abstracts of 432 articles, and applying the exclusion and inclusion criteria, six articles were selected. These articles focused on interventions and pain management in patients with postoperative fractures. All articles were published between 2018 and 2022, utilized the randomized controlled trial method, and were written in English (Table 2).

In this article, the methods of fracture pain management were categorized into two groups: pharmacology and assistive devices. Pharmacological pain management involved peripheral nerve block anesthesia, antioxidant (vitamin C), intravenous tranexamic acid, and intravenous dexamethasone. Assistive devices, such as the Calculator and Comprehensive Pain Plan, were used as management tools. The analysis of the five articles revealed the following characteristics.

**Table 1.** Quality Assessment

| Author (Year)             | JBI Critical Appraisal Checklist |       |
|---------------------------|----------------------------------|-------|
|                           | %                                | Score |
| Sort (2021)               | 69.23                            | 9/13  |
| Jamieson (2019)           | 81.81                            | 9/11  |
| Sumit Kumar et al. (2018) | 72.72                            | 8/11  |
| Haomin Cui et al. (2021)  | 76.92                            | 10/13 |
| Alemnew et al. (2021)     | 69.23                            | 9/13  |

**Table 2.** Included Studies Characteristics.

| Author (Year)          | Design       | Age   | Gender           | Intervention                                           | Tool Measuring             | Pre Pain | Post Pain | Results     |
|------------------------|--------------|-------|------------------|--------------------------------------------------------|----------------------------|----------|-----------|-------------|
| Sort et al. (2021)     | RCT          | 44-66 | M: 31<br>F: 46   | Peripheral nerve block anaesthesia                     | Pain NRS (0-10)            | 4        | 2         | Reduce pain |
| Jamieson et al. (2019) | Cohort Study | 48-53 | M: 111<br>F: 110 | Predictive Pain Calculator and Comprehensive Pain Plan | Visual Analog Scale (0-10) | N/A      | N/A       | Reduce pain |
| Jain et al. (2019)     | Cohort Study | 20-60 | M: 45<br>F: 15   | Anti-oxidants (vitamin-C)                              | Visual Analog Scale (0-10) | 4        | 2         | Reduce pain |
| Cui et al. (2021)      | RCT          | 18-40 | M: 63<br>F: 33   | Intravenous tranexamic acid                            | Visual Analog Scale (0-10) | 5        | 4         | Reduce pain |
| Alemnew et al. (2020)  | RCT          | 18-65 | M: 51)<br>F: 9   | Intravenous dexamethasone                              | Pain NRS (0-10)            | 3        | 2         | Reduce pain |

The research was conducted in various countries, including England, Denmark, India, China, Ethiopia, and the United States (with one article from each country). Overall, the study involved 812 participants, ranging in age from 16 to 67 years. The findings indicate that the Predictive Pain Calculator and Comprehensive Pain Plan, peripheral nerve block anesthesia, antioxidant (vitamin C), intravenous tranexamic acid, and intravenous dexamethasone can help reduce pain in postoperative fracture patients (Table 3).

## DISCUSSION

### Fractures and Postoperative Pain

A fracture is a condition where there is a complete or partial loss of bone continuity, usually caused by trauma. In patients undergoing surgery for fractures, one of the

problems that can arise is pain resulting from the wounds and surgery itself.

Postoperative pain is an unintended consequence of surgery and poses a major challenge for healthcare providers (Jain et al., 2019). Effective pain relief is necessary to reduce the level of pain experienced by fracture patients. In postoperative patients, pain can be severe and persistent, with an average duration of 72.45 minutes, significantly affecting patient comfort. Therefore, a comprehensive understanding of fractures is crucial for orthopedic treatment planning, which can help reduce hospitalizations, outpatient visits, and optimize the allocation of surgical resources (Bergh et al., 2021).

Pain can be experienced throughout the entire area of the fracture. To address the issue of pain in fracture patients, effective pain management approaches are required. Broadly speaking, there are two main approaches to

Table 3. Data Charting

| Author (Year)<br>Country          | Design | Intervention                                           | Sample | Results                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------|--------|--------------------------------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sort et al. (2021)<br>Denmark     | RCT    | Peripheral nerve blocks (PNBs)                         | 375    | PNB's success rate is >94%. PNB is better than SA. Benefit of PNB can decrease pain scores and morphine consumption, although pain rebounds substantially when PNB subsides. The quality of the group score is 99% PNB vs 90% SA.                                                                                                                                                                                          |
| Jain et al. (2019)<br>India       | Cohort | antioxidant (vitamin-C)                                | 60     | The group receiving vitamin C showed increased VAS scores at the end of the second and sixth weeks of follow-up, decreased analgesia requirements and improved functional outcomes compared with the placebo group.<br>Vitamin C supplementation helps reduce the need for analgesics in patients undergoing surgery for foot and ankle trauma, improves VAS scores and achieves better functional outcomes.               |
| Jamieson et al. (2019)<br>Amerika | Cohort | Predictive Pain Calculator and Comprehensive Pain Plan | 221    | After the intervention, prescribed opioids decreased by 63% or 120.2 to 11.7 8.9 milligram morphine (MME) pills/surgery. Opioid consumption decreased 58% 25.0 to 16.7 pills/surgery. Opioid use decreased from 13.5 pills/surgery to 10.3 pills/surgery. Implementation of pain plans and calculators affects the likelihood of pain control that the patient assesses but is unsatisfactory or unplanned opioid refills. |
| Cui et al. (2021)<br>China        | RCT    | Intravenous tranexamic acid                            | 96     | The mean VAS pain score on elbow movement showed a significant difference between the two groups on POD 1 (TXA: 5 vs. placebo: 6,P.003) and POD 2 (TXA: 4 vs. placebo: 5,P.023) . Intravenous administration of TXA significantly decreased postoperative drainage volume and estimated total blood loss and reduced elbow pain with movement during the early postoperative days in patients undergoing OEA.              |
| Alemnew et al. (2020)<br>Ethiopia | RCT    | Intravenous dexamethasone                              | 60     | There was a significant difference between the groups in the time to first analgesia, tramadol, diclofenac and morphine with p-values of 0.017, 0.036 and 0.046, respectively. For pain severity scores, differences were found at 6 hours (p 0.039) and 12 hours (p 0.024), but there was no significant reduction in the incidence of postoperative nausea and vomiting (p 0.448).                                       |

pain management: pharmacological and non-pharmacological methods (Butu, 2018). In this study, we identified several ways to manage pain in postoperative fracture patients.

### **Intervention 1: Pain management with a pharmacological approach**

Analgesics are one of the primary therapeutic options used in pain management for fracture patients (Siti, 2017). Pharmacological therapy is commonly employed to reduce pain in fracture patients.

**Peripheral Nerve Block (PNB).** Peripheral nerve blocks are considered a beneficial anesthesia method in surgery, helping to improve comfort and reduce pain in fracture patients (Henningesen et al., 2018). Sort et al. (2021) demonstrated that successful PNB significantly reduced fracture pain scores and morphine consumption, although pain returned when the PNB effect subsided. Haslam et al. (2013) supported the use of regional nerve block anesthesia as an optimal approach for providing analgesia, promoting mobilization, and reducing acute hospitalization time in pain patients.

**Vitamin C.** Vitamin C acts as an antioxidant, stabilizing reactive oxygen species (ROS) that cause damage to membrane lipids and microcirculation. Its use aims to reduce vascular permeability, limit protein loss, aid in the healing process, and alleviate pain in postoperative fracture patients (Aim et al., 2017). Administration of vitamin C in postoperative fracture patients has shown increased pain scores, reduced analgesic requirements, and improved functional outcomes (Jain et al., 2019).

**Intravenous Tranexamic Acid.** Tranexamic acid (TXA) is an amino acid that inhibits plasminogen activation and exerts an antifibrinolytic effect (Xiao et al., 2019). Intravenous administration of tranexamic acid significantly reduces postoperative drainage volume, the risk of blood loss, and pain in postoperative fracture patients (Cui et al., 2021).

**Intravenous Dexamethasone.** Uncontrolled pain in postoperative patients poses risks of severe morbidity related to venous thrombosis, pulmonary embolism, pneumonia, and myocardial infarction. Intravenous dexamethasone helps improve postoperative analgesia, thereby reducing pain (Heesen et al., 2019). Alemnew et al. (2020) demonstrated

that intravenous dexamethasone administration can reduce pain levels in postoperative fracture patients. Similarly, Abdallah et al. (2015) found that intravenous dexamethasone reduces pain scores, opioid consumption, and improves postoperative comfort in fracture patients.

### **Intervention 2: Pain management with a pain plan approach**

Comprehensive pain care should involve effective collaborative treatment and care, aiming to minimize side effects and alleviate pain severity (Tick et al., 2018). Jamieson et al. (2019) found that implementing comprehensive pain planning for outpatient surgery reduces opioid prescription, consumption, and wastage, while improving pain relief.

## **CONCLUSION**

Pain issues faced by fracture patients not only impact their health but also affect various aspects of their lives. The management of postoperative fracture patients needs to be further developed, particularly in reducing the level of pain experienced by these patients. The results of this scoping review demonstrate that pain management in postoperative fracture patients can be achieved through pharmacological approaches, including peripheral nerve block anesthesia, antioxidant (vitamin C) administration, intravenous tranexamic acid, intravenous dexamethasone, and the utilization of management tools such as the Calculator and Comprehensive Pain Plan. Therefore, based on the findings of this scoping review, nurses can recommend these strategies to other healthcare professionals, including doctors, as a pain management strategy for postoperative fracture patients.

### **Declaration of Interest**

*The authors declare that no conflicts of interest exist.*

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### **Data Availability**

*The datasets generated during and/or analyzed during the current study are available from the*



corresponding author on reasonable request.

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# Non-pharmacological intervention to reduce pain post-appendectomy: A rapid review of randomized controlled trial studies

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## ABSTRACT

**Background:** Appendicitis leads to post-appendectomy pain with significant physical and mental implications, necessitating non-pharmacological pain management approaches.

**Objective:** This study aimed to determine which non-pharmacological interventions can effectively reduce postoperative pain following an appendectomy.

**Design:** A rapid review study design was employed.

**Data Sources:** The databases used were EBSCOhost-CINAHL and PubMed. The article search was conducted on March 14, 2022.

**Review Methods:** The identified articles were described using PRISMA guidelines and sorted based on inclusion criteria. These criteria included patients with appendicitis aged 18-59 years who underwent appendectomy, non-pharmacological pain management interventions, studies utilizing the Randomized Controlled Trial (RCT) method, full-text articles available, English language, and articles published between 2012-2022. Studies involving pediatric and elderly appendectomy patients, as well as studies with insignificant results, were excluded.

**Results:** Four articles were analyzed, revealing four types of interventions: Foot and Hand Reflexology (Massage), Lavender Aromatherapy and Almond oil (Aromatherapy), Inhalation aromatherapy with sweet-scented geranium essential oil, and Acupressure Le7. These interventions were then classified into two categories: aromatherapy-based interventions and neurostimulation-based interventions. All interventions were found to significantly reduce pain in appendectomy patients.

**Conclusions:** Non-pharmacological therapies, such as lavender and almond oil aromatherapy, sweet-scented geranium aromatherapy, foot and hand reflexology, and Le7 acupressure, have demonstrated positive effects in reducing long-term pain after an appendectomy.

**Keywords:** appendectomy; appendicitis; pain; non-pharmacological intervention

## INTRODUCTION

Appendicitis is the leading cause of acute inflammation in the right lower quadrant of the abdomen and the most common cause of emergency abdominal surgery ([Smeltzer, 2018](#)).

## Nursing and Healthcare Practices

- Nurses play a role in implementing and administering non-pharmacological therapies to patients who have undergone an appendectomy.
- Nurses are responsible for assessing the effectiveness of aromatherapy-based interventions, particularly lavender and almond oil aromatherapy, in reducing pain after an appendectomy.
- Nurses are involved in providing neurostimulation-based interventions to patients post-appendectomy and monitoring the outcomes of these interventions in pain management.

The standard management and treatment for acute appendicitis are surgery or surgical appendectomy (Jones et al., 2021). According to Potter and Perry (2013), appendectomy is a procedure that affects the occurrence of pain. Generally, severe pain is felt within the first 2 hours after appendectomy surgery. Pain is subjective, and the stimulus can be physical or mental, so the pain felt can drain energy and disrupt relationships between individuals, affecting the meaning of life (Potter et al., 2013). Pain also interferes with a person's functional abilities and quality of life (Berman et al., 2015).

According to Ferris et al. (2017), in the 21st century, the global incidence of appendicitis accumulated to 100,000 cases, with the highest number occurring in newly industrialized countries in Asia. In Indonesia, the incidence of acute appendicitis is around 24.9 cases per 10,000 population (Wijaya et al., 2020). Based on Indonesia's 2014 Household Health Survey, appendicitis ranks highest among abdominal emergency cases (Depkes RI, 2015). Approximately 300,000 appendectomy operations are performed every year on patients with acute appendicitis (Perez & Allen, 2018).

According to a study by Manworren et al. (2021), more than 50% of patients reported moderate to severe pain after laparoscopic appendectomy in the first three days. The non-pharmacological approach to pain management, such as relaxation, is an intervention that affects

the client's response to pain. Pain management with relaxation interventions includes deep breathing exercises, progressive relaxation, guided imagery relaxation, and meditation (Smeltzer, 2018).

In this study, we chose non-pharmacological interventions because non-pharmacological pain management is a pain relief strategy that does not involve the use of drugs but instead focuses on caring behaviors. Therefore, medical personnel, particularly nurses, play a dominant role. Thus, one of the essential aspects for nurses in dealing with pain is to develop competence and continuously enhance their understanding of non-pharmacological pain management. As a result, researchers became interested in conducting research related to non-pharmacological interventions to reduce pain in post-appendectomy patients. The research was conducted by analyzing relevant literature through a literature review.

## METHODS

### Design

The method used in this study is a rapid review. This method allows researchers to produce evidence in a short time, in accordance with the research objectives. The rapid review is a simplified version of a systematic review.

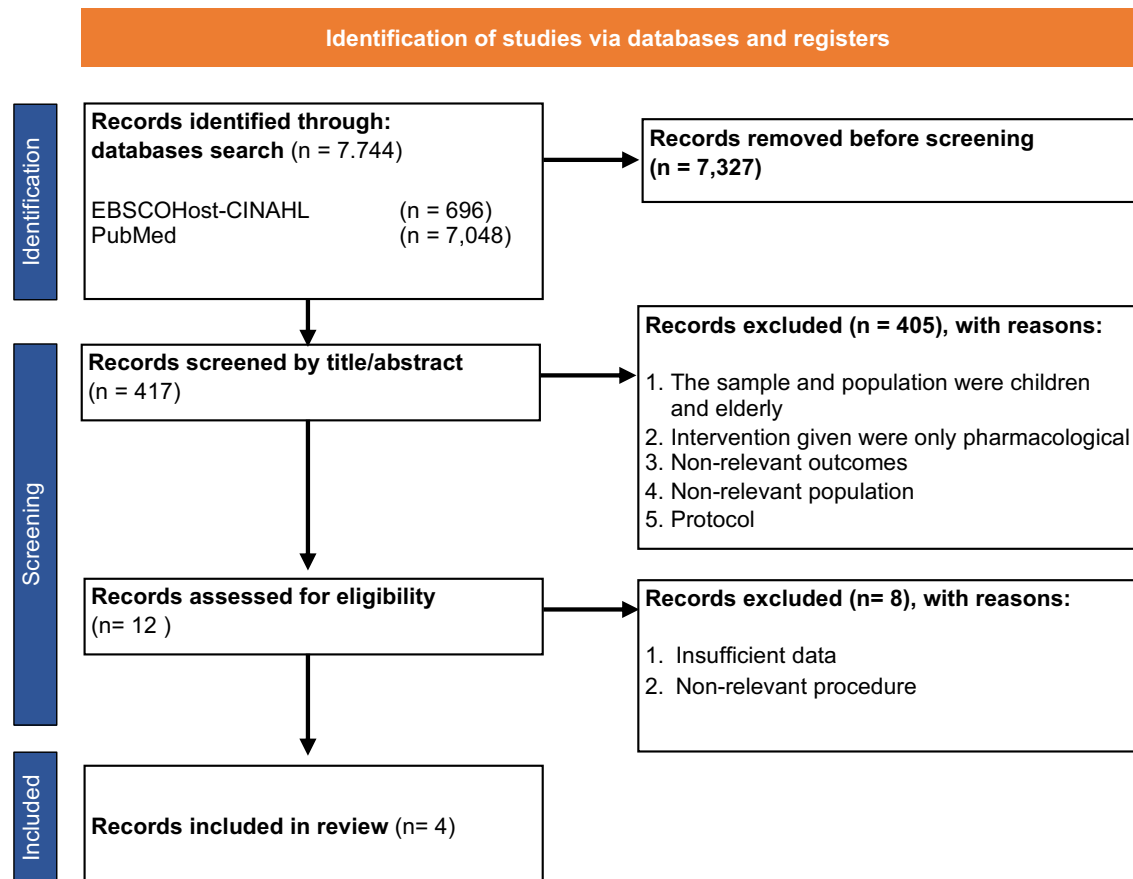
### Search Methods

The literature identification process utilized electronic databases, namely EBSCOhost-CINAHL and PubMed. The research question, "What are the interventions to treat pain in patients with appendectomy?" formed the basis for compiling the PICO (Population, Intervention, Comparison, Outcome), which was the searching tool applied in this study. The keywords used in the article search included: "Appendectomy Patient" OR "Appendicitis" AND "Postoperative" AND "Non-Pharmacology" AND "Intervention" OR "Management" OR "Treatment" AND "Pain" OR "Acute pain."

### Eligibility Criteria

The identified articles are described in PRISMA. Article selection is based on conformity with the inclusion and exclusion criteria. The inclusion criteria in this study were as follows: appendicitis patients aged 18-59 years who underwent appendectomy, non-pharmacological therapy to reduce pain, research articles using the Randomized





**Figure 1.** PRISMA Diagram of Searching Process

Controlled Trial (RCT) method, full-text articles in English, and studies conducted between 2012 and 2022. Meanwhile, articles with study samples of pediatric and elderly appendectomy patients showing insignificant results were excluded.

### Data Extraction

The extracted articles include title, author, year, country, study design, population and sample, procedure, intervention, and important results (Table 1).

### Data Analysis

The articles are read in full and then analyzed, classified based on interventions and outcomes in reducing pain in post-appendectomy patients. The findings are presented in a narrative form.

### Ethical Consideration

This research used humans as the respondents, the author already get ethical consideration from the Ethical Health Commission Faculty of Nursing, Universitas Airlangga with the number of certificate 125/KEP/2021.

## RESULTS

The initial search yielded 7,744 articles from two databases, EBSCOHst-CINAHL and PubMed. A total of 7,327 articles were eliminated because they did not meet the criteria, such as not being RCTs, lacking full text, or being published over 10 years ago. From the remaining 417 articles, a filtering process based on the title and abstract was conducted. Out of the 417 articles, 12 were selected for a more detailed reading, while the others were excluded. After reading the 12 articles in depth, 4 relevant articles were identified for further analysis. Figure 1 illustrates the selection process.

As shown in Table 1, the four identified articles were published within the last 10 years, specifically in 2013, 2020, and 2021. All of them utilized randomized controlled trials (RCTs). These articles originated from Iran, and based on the extracted data, a total of 435 participants were included in the studies. All participants underwent appendectomy surgery. The Visual Analogue Scale (VAS) was used as the instrument to measure pain in the patients across these articles. The interventions



Table 1. Data Extraction

| Author, Year                 | Study Design | N   | Intervention                                                     | Duration         | Tools | Duration of Measurement Outcome | Results                                                                                                                  |
|------------------------------|--------------|-----|------------------------------------------------------------------|------------------|-------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Taheri, et al, 2019          | RCT          | 38  | Foot and Hand Reflexology (Massage)                              | 20 minutes       | VAS   | 24 hours after intervention     | Foot reflexology can significantly reduce pain ( $p < 0.001$ ) compared to hand reflexology                              |
| Ghadirian, et al, 2020       | RCT          | 120 | Lavender Aromatherapy and Almond oil (Aromatherapy)              | 3 minutes/ stage | VAS   | 30 minutes after intervention   | The use of lavender aromatherapy showed significant results in reducing pain ( $p < 0.001$ )                             |
| Gazerani et al, 2021         | RCT          | 120 | Inhalation aromatherapy with sweetscented geranium essential oil | 5 minutes        | VAS   | 30 minutes after intervention   | Effect of inhaled aromatherapy with sweet-scented geranium showed significant results in reducing pain ( $p < 0.001$ )   |
| Adib-Hajbaghery & Etri, 2013 | RCT          | 70  | Acupressure appendectomy at point Le7 (right leg)                | 10 minutes       | VAS   | 7 hours after intervention      | Post-appendectomy pain intensity in the intervention group was significantly lower than the control group ( $p = 0.02$ ) |

investigated in the studies included foot and hand reflexology (massage), lavender aromatherapy and almond oil (aromatherapy), inhalation aromatherapy with sweet-scented geranium essential oil, and acupressure on the Le7 acupoint.

The procedure for Foot and Hand Reflexology involved applying olive oil massage to specific areas of the feet (heel, outer edge of the right foot, and inner edge of the left foot) and palms (inner right palmar arch and scaphoid tubercle on the left hand) after prior cleaning using a wet sponge (Taheri et al., 2019). Lavender aromatherapy and almond oil intervention included using two drops of french lavender extract combined with almond oil, which were then dripped onto a handkerchief. The patient inhaled the aromatherapy from the handkerchief for 3 minutes, holding it 2.5-5cm away from the patient's nose (Ghadirian et al., 2020). The sweet-scented geranium essential oil intervention involved placing 3 drops of 1% geranium essential oil onto a cotton swab. The patient then inhaled the aroma from the swab positioned 10 cm away for 5 minutes, after which the physiological pain index was recorded (Gazerani et al., 2021). Lastly, the Le7 Acupressure intervention involved wearing a bracelet or acuband on the right leg and positioning it on the Le7 acupoint (Adib-Hajbaghery & Etri, 2013).

## DISCUSSION

This literature study identified two groups of interventions that were found to relieve pain in post-appendectomy patients. The first group is aromatherapy-based intervention, which includes lavender aromatherapy and geranium aromatherapy inhaler. The second group is nerve stimulation-based intervention, consisting of hand and foot reflexology massage and acupressure.

### Aromatherapy-Based Intervention

The use of lavender aromatherapy has shown significant results in reducing pain for patients undergoing appendectomy (Ghadirian et al., 2020). When the fragrance is inhaled, the molecules of these substances are transmitted through the olfactory system to the limbic system in the brain, which then responds to the stimuli and causes positive psychological effects (Shirzadegan et al., 2017).

The inhalation of sweet-scented geranium aromatherapy also demonstrates significant

results in reducing pain in appendectomy patients (Gazerani et al., 2021). Olfactory receptors convert odors into nerve impulses and send them to the limbic system. When the limbic system is influenced by these nerves, the aroma can stimulate the release of neurotransmitters and endorphins in the brain, thereby creating a feeling of relaxation (Gazerani et al., 2021).

Previous research supports these findings. Metawie et al. (2015) found that lavender oil inhalation is an effective non-invasive and non-pharmacological intervention for postoperative pain management. Surya et al. (2020) discovered that lavender and rose aromatherapy can reduce pain in postoperative patients. Another study showed that aromatherapy massage with lavender and chamomile oils can reduce and control pain in burn patients (M Gallo et al., 2022).

## Neurostimulation-Based Interventions

Reflexology is a massage technique that stimulates reflex points on organs, such as the palms of the hands and feet, to open energy pathways and increase comfort (Eghbali et al., 2012). A 20-minute reflexology intervention demonstrated effective results, with foot reflexology showing a decrease in pain on the VAS scale by 6.63, and hand reflexology by 5.42 (Taheri et al., 2019). Reflexology reduces pain by stimulating energy and nerve pathways, increasing blood flow and oxygenation, and triggering the release of endorphins and pain-relieving substances (Garimella & Celini, 2013). These results align with a study by El-Fadl (2021), which showed that reflexology can reduce postoperative pain in appendectomy patients. Reflexology is an economical, safe, and simple method that can be applied to postoperative appendicitis patients, suppressing endocrinological and neuroendocrinological responses that contribute to reduced pain intensity (Khorsand et al., 2015).

Acupressure was applied to the Le7 acupuncture point, known for its effectiveness in reducing acute and chronic appendicitis pain (Adib-Hajbaghery & Etri, 2013). The Le7 acupressure intervention demonstrated effective results in reducing pain on the VAS scale, with a decrease of 1.57 after 7 hours of intervention (Adib-Hajbaghery & Etri, 2013). Acupressure points P6 and Le7 in reducing

nausea, vomiting, pain, and vital signs in post-appendectomy patients. Similarly, a study on acupuncture at the L14 point for 20 minutes, with 10-second pressure and 2-second resting periods, resulted in a significant reduction in pain levels (Narimani et al., 2018).

## CONCLUSION

Pain in postoperative appendicitis patients can be alleviated through aromatherapy-based interventions (lavender and almond oil aromatherapy, sweet-scented geranium aromatherapy) and neurostimulation-based interventions (foot and hand reflexology, Le7 acupressure). These interventions have been proven to have calming and analgesic effects, relieve muscle spasms, improve blood circulation, soothe nerves, and provide long-term pain relief after appendectomy. These interventions are easy to administer, have minimal complications, and offer improved care following appendectomy. The nursing implication of this study highlights the role of nurses as care providers who prioritize fulfilling patients' basic needs, ensuring their sense of security and comfort by addressing pain. This research serves as evidence-based practice in the provision of non-pharmacological therapies to reduce pain, particularly in postoperative patients. Future research should focus on addressing the challenges related to reducing pain scale and improving appendectomy wound healing duration, as these factors can impact patients' activities and sleep quality. Thus, further studies investigating effective therapies to address these issues would be beneficial. The findings of this research can serve as a valuable reference for future researchers in the field.

## Declaration of Interest

*The author declares that this manuscript does not have a conflict of interest with the other study or author.*

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## Data Availability

*The datasets generated during and/or analyzed during the current study are available from the*

corresponding author on reasonable request.

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