Efficiency of Self-Acupressure Techniques on Quality of Sleep among Patients with Acute Coronary Syndrome

Eman Ali Metwaly [(1)], Samah Mahmoud Mohamed[(2)]
(1) Assist. Prof of Medical Surgical Nursing, Faculty of Nursing, Zagazig University,
(2) Lecturer of Medical Surgical Nursing, Faculty of Nursing, Zagazig University.

Abstract

Background: Self-acupressure is a significant non-pharmacological modality, which is effective in improving sleep quality. **Aim:** This study aimed to evaluate the efficiency of self-acupressure techniques on quality of sleep among patients with Acute Coronary Syndrome (ACS). **Design**: A quasi-experimental design was used. **Subjects**: A purposive sample of 60 patients with ACS, divided into two groups (30 patients for each). **Setting**: This study was established in two Cardiac Care Units (CCUs), affiliated in Zagazig University Hospitals.**Tools**: A Structured Patients' Interview Questionnaire, Patients' Practice Observational Checklists Regarding Self-Acupressure Techniques, and the Geroningen Sleep Quality Scale. **Results:** The study group patients showed a marked increase in knowledge scores post-intervention compared to the control group. There were highly statistically significant improvements in patients' practices regarding self- acupressure techniques in the study group on post-intervention days 1, 2, and 3 compared to control group ($p < 0.01$). Patients in the study group exhibited significant improvements in quality of sleep, with highly statistically significant differences compared to the control group on post-intervention days 1, 2, and 3 ($p < 0.01$). A highly statistically significant strong negative correlation was found between self-acupressure practices and quality of sleep among patients in the study group on post-intervention days 1, 2, and 3 ($p < 0.01$). **Conclusion:** Self-acupressure intervention had a statistically significant positive effect on enhancing patients' knowledge and practice, which subsequently improved quality of sleep among patients with acute coronary syndrome. **Recommendations:** Self-acupressure techniques should be incorporated into the routine care of ACS patients in CCUs to effectively manage sleep disturbances.

Keywords: Acute Coronary Syndrome, Quality of Sleep, and Self -Acupressure.

Iintroduction:

Acute coronary syndrome (ACS) is a life-threatening condition that significantly contributes to global morbidity and mortality. Its incidence is rising worldwide, with projections indicating an increase of 120% in females and 137% in males in developing countries by 2020, compared to a 30–60% increase in developed countries **(Alkhaqani, 2023)**. Cardiovascular diseases account for about one-third of all deaths globally, with ACS and sudden death causing approximately 1.8 million deaths annually **(Theofilis, et al., 2023, & Juzar, et al., 2022)**.

The ACS encompasses a broad clinical spectrum of serious cardiovascular diseases, including ST-segment elevation myocardial infarction (STEMI), non-ST-segment elevation myocardial infarction (NSTEMI), and unstable angina. The underlying pathophysiology involves reduced blood flow to a part of the heart muscle, typically due to plaque rupture and thrombus formation, or in some cases, coronary vasospasm. This leads to myocardial ischemia and may progress to myocardial infarction (MI) **(Estrada, et al., 2024)**.

Sleep disturbances during hospitalization have been linked to a range of adverse clinical outcomes, including increased in-hospital mortality, higher incidence of stroke, and worsened disease progression **(Vedantam, et al., 2022)**. In addition to impairing emotional regulation, weakening immune function, and delaying wound healing, increase the risk of hypertension, heart attack, and hypoxia, hypercapnia **(Astin, et al., 2020)**.

In Cardiac Care Unit (CCU), sleep disturbance among ACS patients may arise from several factors. These include CCU-related factors, such as care routine and environmental stimuli like noise, light, and patient care interactions. Additionally, patient-related factors as the acute nature of patients' condition, as well as, treatment-related factors such as side effects of medications **(Magdy, Metwally, & Makhlouf, 2019)**. To address these challenges, various complementary methods have been used to help ACS patients overcome sleep disturbances. These methods include self-acupressure, mental imagery, relaxation techniques, music therapy, and massage (**Doğan & Taşcı, 2020)**.

Acupressure, a variant of acupuncture, is a non-pharmacological intervention rooted in traditional Chinese medicine (TCM), which uses fingers, knuckles, or instruments to apply pressure at specific points on the body, known as acupoints, which lie along meridians, channels for flow of Qi that is the vital energy of the body. It is based on the principle of acupoints stimulation, which aims to restore Qi balance and support organ function, thereby promoting relaxation, relieving muscle tension, reducing stress, relieving symptoms, decreasing fatigue, and significantly improving sleep quality **(Abo-Hadida, et al., 2022)**.

Acupressure is a non-invasive technique that can be easily learned and practiced by patients and their family members, enhancing their involvement in symptom management and daily care. Therefore, healthcare providers, particularly nurses, should be trained to teach patients how to perform acupressure techniques as a part of care **(Başak, Turan, & Özer, 2025)**. Given its simplicity, safety, and no cost, self-administered acupressure is a practical, home-based intervention that can reduce reliance on medications and minimize associated side effects **(Xie, et al., 2023)**. It is essential to provide patients with evidence-based education enhancing their awareness about self-acupressure as a complementary therapy **(Goldman & Harte, 2020)**.

Significance of the study:

Patients with ACS often experience sleep disturbances due to alterations in their sleep patterns, physiological stress of their condition, and environmental factors in CCUs, such as noise, lights, and frequent monitoring **(Miranda-Ackerman, et al., 2020)**. This inadequate sleep poses serious health risks, as it activates the sympathetic nervous system, leading to elevated blood pressure and heart rate, thereby increasing cardiovascular risks **(Magdy, Metwally, & Makhlouf, 2019)**.

Despite the critical importance of sleep quality in promoting recovery and reducing cardiovascular risks, it is often neglected by healthcare team members, leaving patients without adequate support to manage their sleep disturbances. Enhancing sleep quality is not merely a comfort measure; it plays a vital role in accelerating recovery, minimizing complications, and improving overall health outcomes. This highlights the need for integrating self-acupressure as a simple, safe, and non-pharmacological method for improving sleep quality **(Abd El Khalik, et al., 2020)**. However, evidence on the efficiency of self-acupressure among critically ill patients remains limited, particularly in CCUs in our country **(Wang, et al., 2022)**. Therefore, this study was conducted to evaluate the efficiency of self-acupressure techniques on quality of sleep among patients with acute coronary syndrome.

Aim of the study:

The current study aimed to evaluate the efficiency of self-acupressure techniques on quality of sleep among patients with acute coronary syndrome through the following objectives:

- Assessing patients' knowledge and practice regarding self-acupressure among patients with acute coronary syndrome.
- Assessing quality of sleep among patients with acute coronary syndrome.

- Designing and applying self-acupressure techniques intervention among patients with acute coronary syndrome.
- Evaluating the efficiency of self-acupressure techniques intervention on knowledge, practices, and quality of sleep among patients with acute coronary syndrome.

Research Hypotheses:

The following research hypotheses were created to accomplish the study's aim:

H1: Patients in the study group will exhibit significantly higher knowledge mean scores compared to those in the control group after intervention.

H2: Self-acupressure techniques practices will demonstrate statistically significant improvements among patients in the study group compared to the control group post-intervention.

H3: Quality of sleep among patients in the study group will prove statistically significant enhancements post application of self-acupressure techniques compared to that of control group.

Operational definitions:

- Self-Acupressure is a non-pharmacological technique that can be independently performed by patients with ACS through applying pressure using either thumb or index finger to specific acupoints, aiming to improve quality of sleep. The targeted acupoints in this study included Yintang, An Mian, Heavenly Pillar, and shenmen.
- Quality of sleep refers to how ACS patients slept the previous night during their stay at CCU. It was measured using The Groningen Sleep Quality Scale.

Subjects and Methods:

Research design:

A pre/post-test quasi-experimental design was utilized in this study. A quasi-experimental design is a particularly useful tool in situations where real experiments are not feasible due to ethical or practical constraints because it is a non-randomized method of assigning subjects into groups **(Thomas, 2020)**.

Setting:

The study was established in two Cardiac Care Unit (CCUs) at the Internal Medical Hospital, affiliated with Zagazig University Hospitals, the first CCU is located on the first floor, comprising two rooms, each containing six beds. The other CCU, located on the third floor, contains one room with 8 beds. Each bed in CCUs is equipped with oxygen supply system, a mechanical ventilator, emergency resuscitation equipment, and a monitoring device, enabling nursing staff to continuously monitor patients 24 hours around-the-clock.

Subjects:

A purposive sample of 60 patients diagnosed with acute coronary syndrome was randomly allocated into two equal groups; study and control group (30 patients in each). The study group received self-acupressure techniques alongside routine hospital care, while control group received routine hospital care only. The sample size was computed using a power and sample size estimation test, assuming 80% power at a confidence level of 95%. The estimated sample size was 60 patients According to the following formula:

$$n = \frac{N \cdot Z^2 \cdot p \cdot (1-p)}{(N-1) \cdot e^2 + Z^2 \cdot p \cdot (1-p)}$$

Patients were eligible who met the following criteria: adult patients of both sexes, aged 20-60 years, confirmed ACS diagnosis, conscious, able to communicate, and willing to participate in the study. Exclusion criteria included sleep apnea, end-stage diseases, emergent cardiac surgery, emergence of acute complications at the time of hospitalization, recent use of sleep medications, cognitive, hearing, or vision impairments, amputation, fracture, neuropathy, or hemiplegia of the upper extremities, and presence of any abnormalities at the acupoints sites.

Data collection tools:

Tool I: A structured Patients' Interview Questionnaire:

It was developed by the researchers by looking over relevant literature and validated

by a panel of experts' feedback. An Arabic translation was made to avoid any misunderstandings. It was split into three main parts, listed below:

Part I: **Patients' Demographic Characteristics**, contained five items as age, gender, marital status, education level, and occupation.

Part II: **Patients' Medical history,** involved five questions covering medical diagnosis, comorbidities, history of cardiac-related hospital admission, times of admissions, and type of treatment.

Part III: Patients' Knowledge Questionnaire Regarding ACS and Self-Acupressure (Pre/Post-test): It was intended to assess patients' knowledge regarding ACS and self-acupressure, adapted from **(Kong & Li, 2022; Lin, et al., 2021; and Mohammadpoor, et al., 2020)**. It involved 18 multiple-choice questions covering three sections:

Section 1: Anatomy of the Heart; contained four questions about coronary arteries, heart valves functions, blood circulation, and pericardial fluid.

Section 2: Acute Coronary Syndrome; included nine questions addressing definition of ACS, causes, risk factors, clinical manifestations, main complaint, timing of heart attacks, susceptible patients to myocardial infarction (MI), characteristics of unstable angina pain, and treatment methods.

Section 3: Self-acupressure; composed of five questions covering definition of self-acupressure, its benefits, contraindications, different acupoints promoting sleep quality, and precautions during applying self-acupressure techniques.

Scoring system: Each correct answer was scored as "one" and incorrect answer or don't know was scored as "zero". The score of each section were summed-up and divided by the numbers of questions to calculate a mean score. Total mean knowledge score was then calculated as the mean of three sections. Means and standard deviations (SD) were calculated for the studied subjects of both groups at pre- and post-intervention and compared based on statistical analysis.

Tool II: Patients' Practice Observational Checklists Regarding Self-Acupressure Techniques (Pre/Post-test days 1, 2, and 3): It was utilized to assess patients' practice regarding self-acupressure techniques, adopted from (**Cheng, et al., 2021; Honarmand, et al., 2020, and; Khalil, Moustafa, & El-Bouraei, 2019)**. It composed of 44 items distributed across five sections, as follows:

Section 1: **Preparation Phase**: It comprised four items as ensuring the patient is in a comfortable position either lying down or sitting, minimizing environmental distractions as possible, ensuring nails are trimmed to avoid discomfort, and warming hands by rubbing them together to create a soothing touch before applying self-acupressure techniques.

Section 2: Yintang (GV24.5) Technique: composed of six items to evaluate the correct application of GV24.5 technique.

Section 3: **An Mian (EX-HN22) Technique:** contained six items for each body side (left and right); totaling 12 items, to assess the bilateral application of EX-HN22 technique.

Section 4: **Heavenly Pillar (B10) Technique:** included 6 items for each body side (left and right); totaling 12 items, to evaluate the bilateral application of B10 technique.

Section 5: Shenmen (HT7) Technique: comprised 6 items for each body side (left and right); totaling 12 items, to assess the bilateral application of HT7 technique.

Each of sections 2, 3, 4, and 5 (corresponding to GV24.5, EX-HN22, B10, and HT7 techniques) was evaluated across six key aspects of technique application: correct identification of acupoint site, use the proper finger for applying pressure, application of moderate pressure strength, maintenance of 1.5 cm pressure depth, correct pressure duration, and adherence to a structured 3-minute pressure sequence.

For bilateral techniques (EX-HN22, B10, and HT7), the six key aspects were assessed separately for the left and right sides of the body, yielding a total of 12 items per technique.

Scoring system: Each item observed as "done" was scored as "1" and the item was "not done" scored as "0", so a higher scores implied better practice. The score of each section was summed-up and divided by the number of items to calculate a mean score for this section. The total mean practice score was calculated as the mean of all sections. Means and standard deviations were calculated for both groups in pre- and post-intervention day1, 2, and 3, then compared established on statistical analysis.

Tool III: The Groningen Sleep Quality Scale (GSQS): (Pre/Post-test days 1, 2, and 3): It was utilized to assess quality of sleep among hospitalized ACS patients on their previous night in the CCU, adopted from (**Herscher, et al., 2021 and Chaudhary, Kumari, & Neetu, 2020)**. It comprised 15 statements, with "True" or "False" response options, assessing various aspects of quality of sleep (e.g., took long to fall asleep, woke up several times, felt tired upon waking up, insufficient sleep…etc). The first item (had deep sleep last night) was excluded from scoring, and the total score ranges from 0 to 14, with higher scores indicating poorer sleep quality.

Scoring system of the GSQS: The first item was excluded from the overall score. One point was assigned for each "True" response to items 2, 3, 4, 5, 6, 7, 9, 11, 13, 14, and 15, and for each "False" response to items 8, 10, and 12. The total score ranged from 0 to 14, representing quality of sleep the previous night. The overall score for this scale was calculated as the mean of all 14 items based on statistical analysis. A higher score indicated poorer sleep quality the night before.

Content validity and reliability:

Content validity was assessed to determine whether the tools covered the study aim or not. It was evaluated by five experts; "three professors of critical nursing staff and two emergency and critical medical staff at Zagazig University" who reviewed the accuracy, relevance, inclusivity, and ease of use of the tools' content. The final version was produced after some minor adjustments were made based on their recommendations. The Cronbach's alpha reliability coefficient for "A Structured Patients' Interview Questionnaire, Patients' Practice Observational Checklists Regarding Self-Acupressure Techniques, and The Groningen Sleep Quality Scale" were "0.88, 0.89, and 0.87", respectively.

Field Work:

The study was carried out over a period of eight months, starting in September 2024 and ending in April 2025.The current study was conducted throughout the following five dynamic phases:

Preparatory phase:

During this phase, the researchers thoroughly reviewed several of recent, relevant publications (textbooks, articles, journals, studies, and internet periodicals) related to ACS management and complementary therapies, with an emphasis on self-acupressure techniques **(Basak, Arslan, & Yildirim, 2024; Byrne, et al., 2023; Chen, Wang, & Zhang 2023; Kim & Park, 2023; and Liu & Zhang, 2022)**. Additionally, the study instruments were established and all necessary booklet preparation procedures were completed.

To ensure proficiency in applying acupressure techniques, the researchers enrolled in an acupressure training course at the Physiotherapy Unit of Zagazig University Hospitals. Upon successful completion, licensed professionals authorized the researchers to independently implement the acupressure techniques.

Assessment phase:

Once all relevant institutional approvals were granted, the researchers approached patients who fulfilled the eligibility criteria and provided their

informed consents, outlined the study's aim and extended an invitation for participation.

A pre-intervention assessment was conducted during the morning shift on the second day of hospitalization, considering the patients' acute phase of ACS, to establish baseline sleep quality during their first night in the CCU. This assessment was performed for each subject in both the study and control groups utilizing the study tools (Tool I, II, & III) as a pretest. Tool I &III took approximately 15-20 minutes to be completed, whereas Tool II required about 25-30 minutes to be filled out from each patient. The gathered baseline data guided the researchers in developing the content of self-acupressure techniques.

Planning phase:

The content of self-acupressure techniques was tailored by the researchers in accordance with the findings from the assessment phase and a review of pertinent, contemporary literature. A brochure in plain Arabic, incorporating both theoretical and practical components along with illustrative images, was constructed to help patients in assimilating and comprehending the offered material. Throughout program execution, priorities were set to establish goals and criteria for anticipated outcomes. To effectively address the unique needs of each patient, a variety of teaching approaches were employed including lectures, demonstrations, and re-demonstrations. Furthermore, PowerPoint slides, informative images, and instructional videos were organized as supplementary teaching aids.

Implementation phase:

The self-acupressure techniques intervention was actualized through a series of sessions that encompassed both theoretical and practical components, conducted in the clinical setting. Each participant in the study group received four individual sessions, one theoretical followed by three practical.

The self-acupressure techniques intervention started on the second day of hospitalization. Following a pre-test assessment conducted in the morning, the theoretical session was held during the afternoon shift; ensuring patients were medically stabilized and adequately prepared. It addressed anatomy of the heart, ACS; its definition, causes, risk factors, clinical manifestations, main complaint, timing of heart attacks, patients susceptible to MI, characteristics of unstable angina pain, and treatment methods. Additionally, the session detailed information about self-acupressure, its definition, benefits, contraindications, specific acupoints promoting sleep quality, and precautions during applying self-acupressure techniques.

The subsequent three sessions were dedicated to the practical component of the intervention. These sessions were conducted on consecutive days, approximately two hours before patients' bedtime. This timing was selected to maximize the effectiveness of the techniques by promoting relaxation and preparing the body for sleep. The schedule was approved by the hospital administration and coordinated with the nursing staff to ensure it did not interfere with standard medical routine.

Each practical session began with researchers-led demonstration of the correct application of self-acupressure techniques, emphasizing adherence to the appropriate pressure strength, duration, and sequence. Participants were trained to accurately allocate the selected seven acupoints, apply moderate and consistent pressure (approximately 3–4 kg) using either the thumb or index finger to evoke sensation of heaviness, numbness, or warmth at the site, and maintain a pressure depth of about 1.5 cm. Participants were instructed to follow a structured 3-minute sequence for each acupoint: 1 minute of direct static pressure, 1 minute of clockwise circular motion, and 1 minute of counterclockwise circular motion. This was followed by a 30

second rest period. A stopwatch was used to ensure accurate timing of each pressure interval. This sequence was repeated across all seven acupoints, resulting in a total duration of 21 minutes per session. After the demonstration, each participant was asked to independently re-demonstrate the techniques under researchers' direct supervision. Immediate corrective feedback was provided to ensure accurate performing of the self-acupressure techniques.

The intervention comprised four distinct techniques applied to seven acupoints: one central acupoint, Yin Tang (GV24.5), located between the eyebrows, and six bilateral points (three on each body side), including an Mian (EX-HN22) located behind the earlobe, Heavenly Pillar (B10) located on the back of the neck, and Shenmen (HT7) located on the inner wrist crease. Each self-acupressure technique targeted a specific acupoint or a group of acupoints to promote relaxation and enhance sleep quality in ACS patients.

The selection of these acupoints based on Traditional Chinese Medicine principles, which emphasize that stimulating these acupoints regulates sleep and promotes relaxation by balancing the flow of vital energy (Qi) through meridians associated with sleep-wake cycles, thereby alleviating sleep disturbances in ACS patients. This selection was further supported by (**Xu, Liu, & Zhang, 2023**; **Zhao & Huang, 2023; Wang & Chen, 2022; Lee & Choi, 2021; and Zhang, Li, & Huang, 2020**), which demonstrated the efficiency of these acupoints in enhancing sleep quality. Furthermore, their anatomical accessibility, being located on easily reachable areas such as the face, neck, and wrists, enabled patients to apply the techniques independently, without external assistance.

To reinforce the self-acupressure techniques, instructional video-films demonstrating the correct application of self-acupressure techniques were shown to participants. In addition, a stopwatch and an illustrated booklet were distributed to each subject in the study group. Participants were instructed to discontinue techniques if they experienced any pain or discomfort. They were also encouraged by the researchers to perform the self-acupressure techniques regularly, approximately two hours before bedtime each night.

In relation to subjects in control group during self-acupressure intervention period, they received routine nursing care provided in the CCU as taking prescribed medications, measuring vital signs and oxygen saturation.

Evaluation phase:

It is the last phase conducted in both CCUs and began immediately after execution of self-acupressure techniques intervention. Patients' knowledge in both groups was evaluated using the same pre-test instrument (Tool I), allowing for a direct comparison with pre-test scores. Additionally, each participant in both groups underwent daily evaluations between 8:00 and 9:00 AM for three consecutive days using the same pre-test tools (Tools II & III) to assess their practice regarding self-acupressure techniques and prior night's quality of sleep. These repeated assessments guarantee consistency of capturing changes in practice and quality of sleep over time. To minimize potential bias, the control group was evaluated first, followed by the study group.

Pilot study:

A pilot study was carried out on six patients (10% of study sample) to examine the tools in terms of clarity, relevance, comprehension, understanding, applicability, and ease of implementation and to estimate the required time to fill in the tools. The findings helped in modifying tools, with necessary corrections or additions are made. Participants involved in the pilot study were subsequently excluded from the main study sample.

Administrative design:

Official approvals from director of Zagazig University Hospitals, heads of both CCUs, and nursing heads were obtained prior establishing the proposed study to make them aware about the aim and objectives of the research, as well as, to get better cooperation during the implementation phase of the study. Also, patients' informed consents were obtained before starting data collection.

Ethical considerations:

Ethical approval from the Research Ethics Committee of the Faculty of Nursing, Zagazig University (ID/Zu. Nur.REC://157) was obtained prior conducting the study. Prior the interview, each subject was informed about the nature, purpose as well as profits of the study to obtain oral consent. Patients were informed that their participation is entirely voluntary and they can withdraw from the study at any time without given any reason. In addition, confidentiality and anonymity of the subjects were assured through coding of all data.

Statistical analysis:

The collected data were organized, tabulated, and statistically analyzed using Statistical Package for Social Science (SPSS) version 25 for Windows. Quantitative data were expressed as mean ± standard deviation (SD), while qualitative data were presented as frequencies and percentages. The Chi-square test or Fisher's exact test was used for comparing categorical variables, as appropriate. The Independent (t) test was utilized to compare means between two unrelated groups. Repeated measures ANOVA (F-test) evaluated within-subject changes in sleep quality across multiple time points. Pearson correlation coefficient test (r) examined the inter-relationships between study variables. Multiple linear regression identified significant predictors of sleep quality. The regression F-test (model ANOVA) evaluated the overall model significance and determine the joint predictive power of independent variables. Reliability of the study tools was calculated using Cronbach's Alpha. P value < 0.05 was considered statistically significant, p value < 0.01 was considered highly statistically significant, and p value ≥ 0.05 was considered statistically non-significant.

Results:

Table 1: Identifies that 43.3% of patients in study group and 46.7% in control group were aged 40 to less than 50 years old, with mean ages of 49.03±6.06 and 47.17±6.62, respectively. Males constituted 70.0% of patients in study group and 63.3% in control group. Also, 96.7% of patients in study group and all patients 100.0% in control group were married. As for educational level, 73.3% of patients in the study group and 60.0% in the control group were educated. As well, 53.3% of patients in study group and 60.0% in control group were not working. However, no statistically significant differences were observed between both groups for any demographic variable ($p > 0.05$).

Table 2: Clarifies that 63.3% and 53.3% of patients in the study and control groups, respectively, had STEMI. Meanwhile, 66.7% of patients in study group and 70.0% in control group had hypertension. In addition, 53.3% of patients in study group and 46.7% in control group had no prior hospital admissions. Moreover, 86.7% of patients in study group and 76.7% in control group received antiplatelets therapy. Nevertheless, no statistically significant differences were found between both groups across all medical history variables ($p > 0.05$).

Table 3: Illustrates that there were no statistically significant differences in baseline knowledge scores between the study and control groups across all items as well as total score pre intervention ($p > 0.05$). However,

post self-acupressure intervention, the study group exhibited a marked increase in knowledge scores concerning heart anatomy, ACS, self-acupressure, and overall score compared to the control group, with all differences between both groups being highly statistically significant ($p < 0.01$).

Table 4: Reveals that, at pre-intervention, there were no statistically significant differences in self-acupressure practices scores across all items and overall scores between the study and control groups ($p > 0.05$). Nevertheless, the study group demonstrated highly statistically significant improvements in self-acupressure practices compared to the control group on post-intervention days 1, 2, and 3 ($p < 0.01$). Furthermore, repeated measures ANOVA revealed a highly statistically significant progressive improvement within the study group across the four assessments (pre-intervention, post-intervention days 1, 2, and 3), with total score increasing from 0.05 ± 0.20 at baseline to 41.67 ± 3.84 by day 3 ($F = 777.82$, $p < 0.01$). In contrast, the control group exhibited no significant changes during the same period ($F = 0.00$, $p = 1.000$).

Table 5: Displays no statistically significant difference in quality of sleep between the study and control groups at pre-intervention ($p = 0.103$). However, the study group exhibited significant improvements in quality of sleep, with highly statistically significant differences compared to the control group on post-intervention days 1, 2, and 3 ($p < 0.01$). Moreover, repeated measures ANOVA confirmed a highly statistically significant progressive improvement within the study group across the four assessment points, with a marked decline in mean sleep quality score from 10.50 ± 1.13 at pre-intervention to 5.03 ± 1.87 by day 3 ($F = 375.21$, $p < 0.01$). Conversely, no significant change was observed in the control group across the same time points ($F = 2.57$, $p = 0.113$).

Table 6: Denotes a highly statistically significant strong negative correlation between self-acupressure practices and quality of sleep among patients in the study group on post-intervention days 1, 2, and 3. The strongest correlation was observed on day 2 ($r = -0.851$), followed by day 1 ($r = -0.849$), and day 3 ($r = -0.847$), with $p < 0.01$. In contrast, no significant correlation was found at pre-intervention ($r = -0.359$, $p = 0.052$).

Table 7: reveals the models for quality of sleep predictors among the study group on post-intervention days 1, 2, and 3. On post-day 1, the statistically significant negative predictors of quality of sleep were self-acupressure practice on day 1 and educational level, with practice on day 1 ($\beta = -0.798$, $p < 0.01$) being the strongest influential predictor. The model explained 76.5% of the variance ($R^2 = 0.765$). The model for post-day 2 illustrates self-acupressure practice on day 2 and 1, and post-intervention knowledge as statistically significant negative predictors, with practice on day 2 ($\beta = -0.351$, $p < 0.05$) was the most influential factor. This model accounted for 84.5% of the variance ($R^2 = 0.845$). The model for post-day 3 identifies self-acupressure practice on day 3 and 1 as statistically significant negative predictors, with practice on day 3 ($\beta = -0.604$, $p < 0.01$) having the most substantial effect. This model explained 77.5% of the variance ($R^2 = 0.775$).

Table (1): Frequency and Percentage Distribution of Demographic Characteristics among Patients in Study and Control Groups (n=60).

Demographic Characteristics	Study (n=30)		Control (n=30)		χ^2 (p-value)
	No.	%	No.	%	
Age (years)					0.659(0.719)
30-<40	6	20.0	7	23.3	
40-<50	13	43.3	14	46.7	
≥ 50	11	36.7	9	30.0	
Mean± SD	**49.03±6.06**		**47.17±6.62**		
Gender					0.300(0.584)
Male	21	70.0	19	63.3	
Female	9	30.0	11	36.7	
Marital status					*FET*(0.532)
Married	29	96.7	30	100.0	
Not married	1	3.3	0	0.0	
Educational level					1.200(0.273)
Educated	22	73.3	18	60.0	
Not educated	8	26.7	12	40.0	
Occupation					0.601(0.438)
Working	14	46.7	12	40.0	
Not working	16	53.3	18	60.0	

χ^2: Chi-square test, FET: Fisher's Exact Test, Non-statistically significant at p > 0.05.

Table (2): Frequency and Percentage Distribution of Medical History among Patients in Study and Control Groups (n=60).

Medical History	Study (n=30)		Control (n=30)		FET(p-value)
	No.	%	No.	%	
Diagnosis					χ^2 =0.618 (0.734)
Unstable angina	7	23.3	9	30.0	
STEMI	19	63.3	16	53.3	
Non-STEMI	4	13.3	5	16.7	
Comorbidities					0.746
Hypertension	20	66.7	21	70.0	
Diabetes Mellitus	10	33.3	11	36.7	
Hospital admission	14	46.7	16	53.3	0.907
Times of hospital admission					0.907
None	16	53.3	14	46.7	
Once	7	23.3	10	33.3	
Twice	5	16.7	4	13.3	
3 times	2	6.7	2	6.7	
Treatment Type					0.768
Antiplatelets	26	86.7	23	76.7	
Anticoagulants	21	70.0	18	60.0	
Thrombolytics	8	26.7	6	20.0	
Beta-blockers	19	63.3	20	66.7	
Diuretics	8	26.7	7	23.3	
Nitrates	9	30.0	10	33.3	
Antihypertensives	19	63.3	21	70.0	
Antidiabetics	10	33.3	11	36.7	

*χ^2: Chi-square test, FET: Fisher's Exact Test, *: not mutually exclusive, Non-statistically significant at p > 0.05.*

Table (3): Mean Scores of Patients' Knowledge in Study and Control Groups at Pre- and Post-Intervention (n=60).

Knowledge Items		Study (n=30)	Control (n=30)	t-test	p-value
		Mean± SD	Mean± SD		
Anatomy of the heart	**Pre**	0.97±0.76	0.93±0.69	0.177	0.860
	Post	3.40±0.67	0.93±0.69	13.985	0.000**
Acute coronary syndrome	**Pre**	1.23±0.81	1.17±0.79	0.321	0.749
	Post	8.03±0.99	1.23±0.85	28.271	0.000**
Self-acupressure	**Pre**	0.03±0.18	0.03±0.18	0.000	1.000
	Post	4.07±0.82	0.03±0.18	26.064	0.000**
Total	**Pre**	2.23±1.54	2.13±1.43	0.260	0.796
	Post	15.50±2.34	2.20±1.51	26.078	0.000**

*t= Independent t-test , Non-statistically significant at p > 0.05, **Highly statistically significant at p < 0.01.*

Table (4): Mean Scores of Patients' Practices Regarding Self-Acupressure Techniques in the Study and Control Groups at Pre-and Post-Intervention Days 1, 2, and 3 (n=60).

Self-Acupressure Practices		Study (n=30)	Control (n=30)	t-test (p-value)	F-test (p-value)
		Mean± SD	Mean± SD		
Preparation	**Pre**	0.05±0.20	0.03±0.18	t = 0.58, p^1= 0.562	F= 222.96, p^5= 0.000**
	Post-day 1	2.17±1.20	0.03±0.18	t= 9.58, p^2= 0.000**	
	Post-day 2	3.17±0.79	0.03±0.18	t= 21.13, p^3= 0.000**	
	Post-day 3	3.77±0.43	0.03±0.18	t= 43.75, p^4 = 0.000**	F= 0.00, p^6= 1.000
Yintang (GV24.5) Technique	**Pre**	0.00±0.00	0.00±0.00	t= 0.00, p^1= 1.000	F= 296.45, p^5= 0.000**
	Post-day 1	3.47±1.65	0.00±0.00	t= 11.47, p^2= 0.000**	
	Post-day 2	4.97±1.09	0.00±0.00	t= 24.77, p^3= 0.000**	
	Post-day 3	5.57±0.56	0.00±0.00	t= 53.64, p^4= 0.000**	F= 0.00, p^6= 1.000
An mian (EX-HN22) Technique	**Pre**	0.00±0.00	0.00±0.00	t= 0.00, p^1= 1.000	F= 813.03, p^5= 0.000**
	Post-day 1	8.23±2.14	0.00±0.00	t= 21.03, p^2= 0.000**	
	Post-day 2	10.33±1.42	0.00±0.00	t= 39.79, p^3= 0.000**	
	Post-day 3	11.20±0.84	0.00±0.00	t= 72.43, p^4= 0.000**	F= 0.00, p^6= 1.000
Heavenly Pillar (B10) Technique	**Pre**	0.00±0.00	0.00±0.00	t= 0.00, p^1= 1.000	F= 712.14, p^5= 0.000**
	Post-day 1	7.90±2.04	0.00±0.00	t= 21.21, p^2 = 0.000**	
	Post-day 2	9.93±1.78	0.00±0.00	t= 30.56, p^3 = 0.000**	
	Post-day 3	10.70±1.29	0.00±0.00	t= 45.41, p^4 = 0.000**	F= 0.00, p^6= 1.000
Shenmen (HT7) Technique	**Pre**	0.00±0.00	0.00±0.00	t= 0.00, p^1= 1.000	F= 599.90, p^5= 0.000**
	Post-day 1	7.47±1.81	0.00±0.00	t= 22.54, p^2= 0.000**	
	Post-day 2	9.77±1.99	0.00±0.00	t= 26.82, p^3= 0.000**	
	Post-da y3	10.43±1.59	0.00±0.00	t= 35.93, p^4 = 0.000*	F= 0.00, p^6= 1.000
Total	**Pre**	0.05±0.20	0.03±0.18	t= 0.58, p^1= 0.562	F= 777.82, p^5= 0.000**
	Post-day 1	29.23±8.27	0.03±0.18	t= 19.31, p^2= 0.000**	
	Post-day 2	38.17±6.23	0.03±0.18	t= 33.47, p^3= 0.000**	
	Post-day 3	41.67±3.84	0.03±0.18	t= 59.24, p^4= 0.000**	F= 0.00, p^6= 1.000

*t= Independent t-test, F-test= Repeated Measures ANOVA, Non-statistically significant at p > 0.05, **Highly statistically significant at p < 0.01.*

P^1: p-value for comparing between two groups at pre-intervention.

P^2: p-value for comparing between two groups on day1 post-intervention.

P^3: p-value for comparing between two groups on day 2 post-intervention.

P^4: p-value for comparing between two groups on day 3 post-intervention.

P^5: p-value for comparing within-group changes over time in the study group pre- and post-intervention days 1–3.

P^6: p-value for comparing within-group changes over time in the control group pre- and post-intervention days 1–3.

Table (5): Mean Scores of Quality of Sleep among Patients in the Study and Control Groups at Pre- and Post-Intervention Days 1, 2, and 3 (n=60).

Quality of Sleep	Study (n=30) Mean± SD	Control (n=30) Mean± SD	t-test (p-value)	F-test (p-value)
Pre	10.50±1.13	10.07±0.86	t = 1.65, p^1 = 0.103	F = 375.21, p^5 = 0.000**
Post-day 1	8.37±1.40	9.97±0.89	t = 5.27, p^2 = 0.000**	
Post-day 2	6.30±1.82	9.93±0.90	t = 9.77, p^3 = 0.000**	F = 2.57, p^6= 0.113
Post-day 3	5.03±1.87	9.93±0.90	t = 12.93, p^4 = 0.000**	

*t= Independent t-test, F-test= Repeated Measures ANOVA, Non-statistically significant at p > 0.05, **Highly statistically significant at p < 0.01.*
P^1: p-value for comparing between two groups at pre-intervention.
P^2: p-value for comparing between two groups on day1 post-intervention.
P^3: p-value for comparing between two groups on day 2 post-intervention.
P^4: p-value for comparing between two groups on day 3 post-intervention.
P^5: p-value for comparing within-group changes over time in the study group pre- and post-intervention days 1–3.
P^6: p-value for comparing within-group changes over time in the control group pre- and post-intervention days 1–3.

Table (6): Correlation between Self-Acupressure Practices and Quality of Sleep among Patients in the Study Group at Pre- and Post-Intervention Days 1, 2, and 3.

Variables		Self-Acupressure Practices							
		Pre		Post-day 1		Post-day 2		Post-day 3	
		r	P	R	P	R	p	R	P
Quality of Sleep	**Pre**	-0.359	0.052						
	Post-day 1			-0.849	0.000**				
	Post-day 2					-0.851	0.000**		
	Post-day 3							-0.847	0.000**

***r**: Pearson correlation coefficient test,, p: p-value, Non-statistically significant at p > 0.05, **Highly statistically significant at p < 0.01.*

Table (7): Multiple Linear Regression Models of Quality of Sleep Predictors among Patients in the Study Group on Post-Intervention Days 1, 2, and 3.

Items	Unstandardized Coefficients		Standardized Coefficients	t-test	p-value	95% Confidence Interval for B	
	B	Std. Error	B			Lower	Upper
Quality of sleep score – Post-intervention Day 1							
Constant	**12.660**	**0.481**		**26.308**	**0.000**	**11.673**	**13.648**
Self-acupressure practice post-day 1	-0.135	0.016	-0.798	-8.323	0.000	-0.169	-0.102
Educational level	- 0.603	0.267	-0.217	-2.261	0.032	-1.151	-0.056
R Square=0.765; **Model ANOVA:** F= 43.906, p<0.001 **Variables entered and excluded:** age, sex, marital status, occupation, diagnosis, comorbidities, times of hospital admission, treatment type, and post-intervention knowledge.							
Quality of sleep score - Post-intervention Day 2							
Constant	**16.388**	**1.016**		**16.122**	**0.000**	**14.298**	**18.477**
Self-acupressure practice post-day 2	-0.103	0.040	-0.351	-2.582	0.016	-0.184	-0.021
Post-intervention knowledge	-0.264	0.100	-0.340	-2.648	0.014	-0.469	-0.059
Self-acupressure practice post-day 1	-0.071	0.026	-0.323	-2.751	0.011	-0.124	-0.018
R Square=0.845; **Model ANOVA:** F= 47.155, p<0.001 **Variables entered and excluded:** age, sex, marital status, educational level, occupation, diagnosis, comorbidities, times of hospital admission, and treatment type.							
Quality of sleep score - Post-intervention Day 3							
Constant	**18.929**	**1.992**		**9.502**	**0.000**	**14.841**	**23.016**
Self-acupressure practice post-day 3	-0.280	0.060	-0.604	-4.661	0.000	-0.403	-0.157
Self-acupressure practice post-day 1	-0.077	0.029	-0.342	-2.641	0.014	-0.137	-0.017
R Square=0.775; **Model ANOVA:** F= 46.500, p<0.001 **Variables entered and excluded:** age, sex, marital status, educational level, occupation, diagnosis, comorbidities, times of hospital admission, treatment type, post-intervention knowledge, and self-acupressure practice post-day 2.							

Significant at P<0.05, Highly statistically significant at P<0.01. F-test: Model ANOVA

Discussion

The current study findings illustrated that less than half of patients in study and control groups aged from forty to less than fifty years old. Also, more than two-thirds of patients in study group and slightly less than two-thirds in control group were males. This result could be related to increased risk of ACS after age of forty. Moreover, males more commonly exposed to risk factors for ACS. Additionally, most of patients in study group and all in control group were married. It could be illustrative the cultural norms in Egypt, where marriage is common among individuals over the age of forty. Moreover, bout three quarters of patients in study group and three fifths of control group were educated. More than half of patients in study group and three-fifths in control group were not working.

These findings agreed with **Abd Elhafez, et al., (2025)** who clarified that that more than one third of patients in study and control groups were aged between 40 and 50 years. Similarly, **Abdelkader, (2024)** indicated that two-thirds of patients in experimental group were male and more than three quarters were educated. As well, **Zou, et al., (2024)** displayed that more than half of ACS patients were unemployed. In the same way, **Ahmadi, et al., (2022)** reported that about two thirds of patients in the study group were male, most were married, and more than half were unemployed. Conversely, **Rafeie, et al., (2021)** showed that three fifths of patients in both groups were employed.

This study results denoted that slightly less than two-thirds of patients in study group and more than half in control group had STEMI. This may be related to the fact that cardiovascular diseases are associated with sleep disturbance and increased myocardial oxygen demand may result from sleep disturbance. Also, more than two-thirds of patients in study group and control group had hypertension. This might explain the fact that hypertension is a well-established risk factor for the development of ACS. Likewise, more than half of patients in study group and less than half of in control group had no prior hospital admissions. As well, the majority of patients in study group and more than three quarters in control group received antiplatelets therapy. These results corroborated those of **Li, et al., (2024)** who denoted that about half of participants had STEMI and about two-thirds had hypertension. Consistent with **Darsin, et al., (2023)** who revealed that more than two thirds of studied patients had hypertension. Furthermore, **Elbashir, et al., (2023)** indicated that most of patients took antiplatelets therapy. Similarly, **Yang, et al., (2023)** reported that more than half of patients in the study sample had no prior hospital admissions.

The findings of the present study revealed that there was a highly statistically significant improvement of patients' knowledge in the study group compared to the control group post self-acupressure intervention, with all differences between both groups being highly statistically significant. This improvement could be attributed to the effectiveness of self-acupressure content based on patients' needs, educational booklet, and simplified verbal instructions, which optimized subjects' comprehension and retention. Furthermore, subjects' intrinsic curiosity and motivation to learn about self-acupressure and their condition may have further amplified their engagement, leading to greater knowledge acquisition.

These results were similar to the findings of a study done by **Li, et al., (2023)** who pointed that participants demonstrated significant improvements in acupressure related knowledge scores after completion of self-administered acupressure program. Likewise,

Rastiti, Strisanti, & Aria, (2022) reported that there was a statistically significant improvement in participants' knowledge regarding acupressure after program implementation. Similarly, **AbdElaal, et al., (2022)** revealed a statistical significant increase in total knowledge scores post nursing guidelines interventions. In the same way, **EbadaElsayed & Mohamed, (2021)** revealed that there was a highly statistically significant difference in patients' level of satisfactory knowledge between study and control groups post-program implementation. Consistently, **Chandran & Binutha, (2020)** found a significant increase in post-test knowledge scores in the experimental group among ACS patients after video-assisted teaching.

The current study results illustrated that the study group patients demonstrated highly statistically significant immediate and sustained improvements in their practices regarding self-acupressure techniques on post-intervention days 1, 2, and 3 compared to the control group. This improvement may be attributed to the structured self-acupressure intervention, which incorporated techniques demonstrations, supervised re-demonstrations, a practical booklet guide, and continuous reinforcement through personalized feedback. Participants' active engagement and willingness to adopt self-acupressure likely enhanced their confidence and technical proficiency. These factors collectively contributed to the observed progressive improvements in both technique performance and total score.

These findings aligned with **Li, et al., (2023)** who documented significant improvements in patients' practice of self-administered acupressure techniques following a structured acupressure program. Likewise, **Shady, Seada, & Mostafa, (2020)** reported significant improvements in self-acupressure practice among participants in the acupressure group immediately after the intervention, with a statistically significant differences between study and control groups. Consistent with these findings, **Waits, et al., (2018)** demonstrated that acupressure training for patients and family members effectively improved sleep quality, highlighting its potential as a non-pharmacological intervention.

The present study results found that the study group exhibited significant improvements in quality of sleep on post-intervention days 1, 2, and 3, with highly statistically significant differences compared to the control group. The observed improvements were attributable to self-acupressure intervention rather than temporal factors. From the researchers' perspective, these results reflected the positive effect of self-acupressure on sleep quality. Practicing the techniques may regulate the autonomic nervous system, induce relaxation, reduce anxiety, and stimulate serotonin release, which in turn enhances melatonin production thereby facilitating sleep onset, all of which contributed directly to improved sleep quality.

These findings were in harmony with, **Başak, Turan, & Özer, (2025)** who exhibited that self-acupressure significantly improved sleep quality among coronary artery disease (CAD) patients. In congruent with **Ling, et al., (2025)** who found that hospitalized patients receiving acupressure demonstrated significantly greater improvements in sleep quality compared to control group receiving usual care. Similarly, **Taheri, et al., (2024)** indicated that acupressure contributes to enhancing levels of sleep quality for patients who undergo cardiac surgery. Additionally, **Soĥ, et al., (2024)** demonstrated statistically significant improvements in sleep quality after cardiac surgery among patients who received non-pharmacological interventions including acupressure compared to control group.

Moreover, **Yuliani, et al., (2024)** mentioned that acupressure significantly improved sleep quality in the experimental group, while no improvement was observed in the control group with a significant difference between both groups. Additionally, **Dincer, et al., (2022)** stated that, self-acupressure restores the flow of defensive energy throughout the body, thereby promoting the proper functioning of energy channels which facilitates better sleep quality.

The current study findings illustrated highly statistically significant strong negative correlations between self-acupressure practices and quality of sleep among patients in the study group on post-intervention days 1, 2, and 3. These findings indicated that consistent self-acupressure practice yields cumulative and sustained sleep quality improvements, supporting its viability as a non-pharmacological intervention for enhancing sleep in ACS patients. These results were in coordination with **Abou Elatta, et al., (2023)** who concluded that there were statistically highly negative significant correlations between acupressure application and sleep quality at midst and last day of hospitalization among the study group. Similarly, **Shourabi, et al., (2024)** mentioned that regular self-administered acupressure practice was significantly associated with progressive improvements in sleep quality over time.

The regression analysis identified self-acupressure practice as a consistent, significant negative predictor of improved sleep quality across post-intervention days 1, 2, and 3 among ACS patients in the study group. The negative regression coefficients reflected improved sleep, as the sleep scale was reverse-scored. This result highlights the efficiency of self-acupressure as an effective non-pharmacological intervention. This finding was supported by **Başak, Turan, & Özer, (2025)** who confirmed self-acupressure as a statistically significant negative predictor of sleep quality in CAD patients, as demonstrated by regression analysis, confirming its effectiveness. Similarly, **Ling, et al. (2025)** whose meta-regression analysis identified acupressure sessions frequency and duration as significant predictors of sleep improvement.

On post-day 1, both self-acupressure practice on day 1 and educational level emerged as significant negative predictors of quality of sleep. These findings confirmed the immediate effect of self-acupressure and suggested that higher-educated patients exhibited better sleep, likely due to better comprehension and adherence to the techniques, thus enhancing intervention efficiency. These findings aligned with, **Soĥ, et al. (2024)** who reported that higher education levels were associated with improved self-care practices, which may positively affect sleep quality.

By post-day 2, the statistically significant negative predictors of quality of sleep involved self-acupressure practice on both day 2 and 1, as well as, post-intervention knowledge, with practice on day 2 emerged as the strongest predictor. These findings reflected both the immediate and cumulative effect of repeated practice, which may enhance autonomic regulation, leading to better sleep. As well, the significant contribution of knowledge reinforced the importance of patient education as better understanding of the techniques likely enhance patients' confidence and accuracy in performing self-acupressure and contributing to improved sleep. These results were consistent with **Yang, et al., (2024)** who stated that both knowledge and sleep hygiene contributed to improved sleep quality among cardiac patients. In contrast, **Sun, et al., (2024)** mentioned that knowledge does not significantly affect sleep quality.

By post-day 3, self-acupressure practice on both day 3 and 1 were significant negative predictors of quality of sleep, with day 3 demonstrating the strongest effect. These results reinforced the role of practice consistency in enhancing sleep quality, likely due to the cumulative stimulation of physiological sleep mechanisms. These results aligned with **Yeung et al. (2022)** who demonstrated the sustained effects of self-administered acupressure on improving sleep quality over several weeks of application.

Conclusion:

Based on findings of the study, it can be concluded that self-acupressure intervention had a statistically significant positive effect on enhancing patients' knowledge and practice of self-acupressure techniques, which subsequently improved quality of sleep among patients with acute coronary syndrome.

Recommendations:

- Self-acupressure techniques should be incorporated into the routine care of ACS patients in CCUs to effectively manage sleep disturbances.
- Sleep quality of ACS patients should be routinely assessed as a part of standard nursing care.
- Standardized protocols for non-pharmacological sleep interventions, including self-acupressure should be developed and implement in CCUs.
- Cardiac nurses should be trained on acupressure techniques, including patients teaching through demonstration and re-demonstration.
- A simple illustrated booklet in Arabic regarding self-acupressure techniques should be available in CCUs.
- Self-acupressure training should be incorporated into cardiac rehabilitation programs to improve sleep.
- Further researches on larger probability sample to compare complementary interventions methods for ACS patients.

Financial support:

No funding.

Conflict of interest:

No Conflict of interest.

Author contribution:

The first author shared in gathering of data, providing pre and posttest, applying the acupressure intervention to patients, taking part in the assortment of references and data analysis. The second author participated in designing data collection tools, preparation of tools and booklet, statistical analysis, comments on the result, references organizing, and administering the acupressure intervention.

References:

Abdelkader, R.R. (2024). Deep Breathing Exercise Application: It's Effect on Physiological Parameters among Patients with Acute Coronary Syndrome. Egyptian Journal of Health Care, 15(2), 52-62. DOI: 10.21608/ejhc.2024.350649**.**

Abd El Khalik, E. F., AbdElbaky, M. M., Ahmed, N. A., &Moursy, S. H. T. (2020). The effectiveness of using breathing exercise on sleep quality among hospitalized patients. American Journal of Nursing, 9(4), 272-280.

AbdElaal, E. M., Abdelall, H. A., Abd-Elhafez, M. N., Abd-Elmohsen, S. A., Abozeid, H. A., &Sobhy Mahmoud, K. M. (2022). Effect of Applying Designed Nursing Guidelines on Health Outcomes among Patients with Heart Failure Class III. Assiut Scientific Nursing Journal, 10(30), 274-287.

Abd Elhafez, M. N., Mobed, K. B., Thabet, O. F., Abdel-Galeel, A., & Hussein, A. H. (2025). Effect of a Nursing Rehabilitation Protocol on Patients' Adherence to Therapeutic Regimen Following Acute Coronary Syndrome. Assiut Scientific Nursing Journal, 13(51), 321-334. DOI: 10.21608/asnj.2025.382251.2076.

Abo-Hadida, R.M., Abdelgawad, M. E., Rashwan, Z. I., & Hamad, N. I. (2022). Effect of Applying Acupressure on the Clinical Outcomes of Critically Ill Children with Respiratory Tract Infections: An Integrative Nursing Approach. Egyptian Journal of Health Care, 13(2), 27-38.

Abou Elatta, S. G., Shereif, W. I., Abo El-Ata, A. B., Hamed, R. H., & Abd El Rahem, H. A. (2023). Effect of implementing acupressure on quality of sleep among patients with breast cancer. Port Said Scientific Journal of Nursing, 10(3), 109–129.

Ahmadi, Z., Abolhassani, S., Hasheminia, A., & Kheiri, S. (2022). The effects of a multimedia education on self-efficacy and self-esteem among patients with acute coronary syndrome: a clinical randomized trial. Iranian journal of nursing and midwifery research, 27(3), 181-187. DOI: 10.4103/ijnmr.IJNMR_92_20.

Alkhaqani, A. L. (2023). Impact Anxiety on Quality of Life and Clinical Outcomes of Patients with Acute Coronary Syndrome. Journal of Cardiovascular and Cardiology, 1(1), 1-7.

Astin, F., Stephenson, J., Wakefield, J., Evans, B., Rob, P., Joanna, G., & Harris, E. (2020). Night-time noise levels and patients' sleep experiences in a medical assessment unit in Northern England. The Open Nursing Journal, 14(1).

Basak, S., Arslan, H., & Yildirim, T. (2024). The effects of acupressure on sleep quality in cardiac surgery patients: A systematic review and meta-analysis. Journal of Nursing Research and Practice, 44(4), 199–206.https://doi.org/10.1016/j.jnursrcp.2024.02.004.

Başak, S., Turan, G. B., & Özer, Z. (2025). The effects of self-acupressure on pain and sleep quality in patients with coronary artery disease: A randomised controlled trial. Pain Management Nursing, 26(1), e10–e17. https://doi.org/10.1016/j.pmn.2024.07.013.

Byrne, R. A., Rossello, X., Coughlan, J. J., Barbato, E., Berry, C., Chieffo, A., Claeys, M. J., Dan, G.-A., Dweck, M. R., Galbraith, M., & Task Force on the management of acute coronary syndromes of the European Society of Cardiology (ESC). (2023). 2023 ESC guidelines for the management of acute coronary syndromes: Developed by the task force on the management of acute coronary syndromes of the European Society of Cardiology (ESC). European Heart Journal, 44(38), 3720–3826. https://doi.org/10.1093/eurheartj/ehad191.

Chandran, P., & Binutha, V. P. (2020). Effectiveness of Video Assisted Teaching on Knowledge Regarding Home Care Management among Patients Diagnosed with Acute Coronary Syndrome. Indian Journal of Public Health Research & Development, 11(3), 352-357.

Chaudhary, A., Kumari, V., & Neetu, N. (2020). Sleep promotion among critically ill patients: earplugs/eye mask versus

ocean sound—a randomized controlled trial study. Critical care research and practice, 2020(1), 8898172.

Cheng, S., Dong, X., Lan, L., He, Z., Yu, S., Yang, Y., & Zeng, F. (2021). Acupuncture for chronic persistent asthma based on the theory of Meridian-viscera Association: study protocol for a multi-center randomized controlled trial in China. Trials, 22(17), 1-9.

Chen, L., Wang, Y., & Zhang, Q. (2023). Self-acupressure for anxiety and sleep quality in post-ACS patients: A randomized controlled trial. Complementary Therapies in Medicine, 75, 102956. https://doi.org/10.1016/j.ctim.2023.102956.

Darsin, S. K., Ahmedy, F. B., Noor, A. B. Y. A., Abdullah, K. L., Abidin, I. Z., &Suhaimi, A. B. (2023). Changes in Perception of Illness during Cardiac Rehabilitation Programme among Patients with Acute Coronary Syndrome: A Longitudinal Study. In Healthcare, 11(3),311.https://doi.org/10.3390/healthcare11030311.

Dincer, B., İnangil, D., İnangil, G., Bahçecik, N., Ayaz, E. Y., Arslanoğlu, A., Keskinler, M.V., Kabuk, A., & Özkan, G. (2022). The effect of acupressure on sleep quality of older people: A systematic review and meta-analysis of randomized controlled trials. Explore, 18(6), 635-645. https://doi.org/10.1016/j.explore.2021.11.010.

Doğan, N., &Taşcı, S. (2020). The effects of acupressure on quality of life and dyspnea in lung cancer: a randomized, controlled trial. Alternative Therapies in Health & Medicine, 26(1), 49.

EbadaElsayed, R.A., & Mohamed, Y. M. (2021). Effect of Multimodal Cardiac Rehabilitation Program on Patients after Acute Myocardial Infarction: Nursing Sensitive Outcomes. Egyptian Journal of Nursing and Health Sciences, 2(2), 54-80.

Elbashir, M., ElHajj, M. S., Rainkie, D., Kheir, N., Hamou, F., Abdulrhim, S., &Awaisu, A. (2023). Evaluation of health literacy levels and associated factors among patients with acute coronary syndrome and heart failure in Qatar. Patient preference and adherence, 2023(17) 89-105.

Estrada, E. A. C., Sequeda, E. R. M., Barros, J. E. B., Ríos, J. A. C., Segura, I. M. R., & Barreto, G. L. L. (2024). Acute coronary syndrome: Definition, pathophysiology, diagnosis, and management. World Journal of Advanced Research and Reviews, 21(1), 2537-2548. DOI: https://doi.org/10.30574/wjarr.2024.21.1.0352.

Goldman, J. D., & Harte, F. M. (2020). Transition of care to prevent recurrence after acute coronary syndrome: the critical role of the primary care provider and pharmacist. Postgraduate Medicine, 132(5), 426-432.

Herscher, M., Mikhaylov, D., Barazani, S., Sastow, D., Yeo, I., Dunn, A. S., & Cho, H. J. (2021). A sleep hygiene intervention to improve sleep quality for hospitalized patients. The Joint Commission Journal on Quality and Patient Safety, 47(6), 343-346.

Honarmand, K., Rafay, H., Le, J., Mohan, S., Rochwerg, B., Devlin, J. W., &Bosma, K. J. (2020). A systematic review of risk factors for sleep disruption

in critically ill adults. Critical care medicine, 48(7), 1066-1074.

Juzar, D., Muzakkir, A., Ilhami, Y., Taufiq, N., Astiawati, T., R A, I. M., Pramudyo, M., Priyana, A., Hakim, A., Anjarwani, S., Endang, J., & Widyantoro, B. (2022). Management of Acute Coronary Syndrome Indonesia: Insight from One ACS Multicenter Registry. Indonesian Journal of Cardiology, 43(2),45-55. https://doi.org/10.30701/ijc.1406.

Khalil, N. S., Moustafa, M. F., & El-Bouraei, Z. H. (2019). Effects of non-therapeutic measures on sleep quality among critically ill patients, Egypt. International Academic Journal of Health, Medicine and Nursing, 1(2), 175-188.

Kim, S., & Park, J. (2023). Effectiveness of acupressure in cardiac rehabilitation: A meta-analysis. International Journal of Nursing Studies, 148, 104567. https://doi.org/10.1016/j.ijnurstu.2023.104567.

Kong, X. Y., & Li, J. (2022). Effect of auricular acupressure nursing on anxiety in patients with acute coronary syndrome. Psychosomatic Medicine Research, 4(4), 22.

Lee, J., & Choi, M. (2021). Acupressure at Yin Tang and Shenmen for anxiety reduction in cardiac patients: A pilot study. Journal of Alternative and Complementary Medicine, 27(5), 432-438.

Li, Z., Benkert, R., Vallerand, A., & Zick, S. (2023). Implementation of self-administered acupressure for chronic low back pain relief among patients in a community free clinic using a smartphone application. Journal of Family Medicine and Community Health, 10(1), 1191.

Li, A., Nie, Y., Chi, M., Wang, N., Ji, S., Zhu, Z., & Hou, Y. (2024). Mediating effect of perceived health competence on the association between mindfulness and adherence to health behaviors in patients with acute coronary syndrome: a cross-sectional study. Patient preference and adherence, 18 (2024), 2203-2215. https://doi.org/ 10.2147/PPA. S487100.

Lin, C. H., Lin, Y. H., Tzeng, I. S., &Kuo, C. Y. (2021). An association rule analysis of the acupressure effect on sleep quality. In 2021 IEEE International Conference on Bioinformatics and Biomedicine (BIBM), 3827-3831. doi: 10.1109/BIBM52615.2021.9669146

Ling, W., Yang, C., Ho, M. H., & Lee, J. J. (2025). Effectiveness of acupressure on sleep quality among inpatients: A systematic review and meta-analysis. Nursing & Health Sciences, 27(1), e70075. https://doi.org/ 10.1111/nhs.70075.

Liu, X., & Zhang, X. (2022). Preparation for implementing a complementary therapy program in a clinical cardiac setting: A focus on acupressure. Journal of Complementary and Alternative Medicine, 28(7), 501–508.https://doi.org/10.1016/j.jcam.2022.06.004.

Magdy, D. M., Metwally, A., &Makhlouf, H. A. (2019). Study of sleep quality among patients admitted to the respiratory intensive care unit. Egyptian Journal of Bronchology, 13(1), 114-119.

Miranda-Ackerman, R. C., Lira-Trujillo, M., Gollaz-Cervantez, A. C., Cortés-Flores, A. O., Zuloaga-Fernández del Valle, C. J., García-González, L. A., & González-Ojeda, A. (2020). Associations between stressors and difficulty sleeping

in critically ill patients admitted to the intensive care unit: A cohort study. BMC health services research, 20(1), 1-10.

Mohammadpoor, M., Davoodvand, S., Hasheminia, S. A., Khaledifar, A., Sedehi, M., &Sheykhshabani, S. Y. K. (2020). Comparison of the effect of instrumental music and holy Quran recitation on the anxiety of patients with acute coronary syndrome: semi-experimental study. Medical-Surgical Nursing Journal, 9(1).

Rafeie, R., Mofrad, Z. P., Momeni, M. K., &Tabas, E. E. (2021). Effect of Couple Education on Spouses' Anxiety and Treatment Adherence in Patients with Acute Coronary Syndrome Admitted to Cardiac Intensive Care Unit. Medical-Surgical Nursing Journal, 10(4) :e123617.https://doi.org/10.5812/msnj.123617.

Rastiti, I. A. A., Strisanti, I. A. S., & Aria, N. K. S. (2022). Providing acupressure education and training for treating headache to society in Peken Hamlet, Renon Urban Village. Jurnal Berkala Kesehatan, 8(2), 116–123.

Shady, R. H. A., Seada, A. I. A., & Mostafa, M. F. (2020). Effectiveness of acupressure in the reduction of pain and anxiety among patients with open thoracotomy. American Journal of Nursing Research, 8(2), 182–191. https://doi.org/10.12691/ajnr-8-2-7.

Shourabi, E., Vagharseyyedin, S. A., Taghanaki, H. B., & Saremi, Z. (2024). The effect of self-administered acupressure on pain severity and sleep quality of patients with knee osteoarthritis: a randomized controlled trial. BMC Complementary Medicine and Therapies, 24(1), 412. https://doi.org/10.1186/s12906-024-04693-x.

Soh, P. Q. P., Wong, W. H. T., Roy, T., & Tam, W. W. S. (2024). Effectiveness of non-pharmacological interventions in improving sleep quality after cardiac surgery: A systematic review and meta-analysis. *Journal of Clinical Nursing, 33*(6), 2084–2098. https://doi.org/10.1111/jocn. 17115.

Sun, W., Pan, R., Song, X., Gu, T., Ni, Q., & Gu, Y. (2024). Knowledge, attitude, and practice toward sleep hygiene and cardiovascular health: a cross-sectional survey among healthcare workers. Frontiers in Public Health, 12, 1415849. https://doi.org/10.3389/fpubh.2024.1415849.

Taheri, S. A., Sandanasamy, S., Okamoto, Y., McFarlane, P., and Heidari, A. M. (2024). Effect of acupressure on sleep quality among patients undergoing cardiac surgery: A systematic review. Journal of Nursing Reports in Clinical Practice, 3(2), 202-209. doi: 10.32598/JNRCP.2405.1097.

Theofilis, P., Oikonomou, E., Chasikidis, C., Tsioufis, K., & Tousoulis, D. (2023). Pathophysiology of acute coronary syndromes—Diagnostic and treatment considerations. Life, 13(7), 1543.https://doi. org/10.3390/life13071543.

Thomas, L. (2020). Quasi-Experimental Design, Definition, Types & Examples. Available at: https://www. scribbr. com/methodology/quasi-experimental-design/ Accessed on: July 15, 2023, 5:15 PM.

Vedantam, D., Poman, D. S., Motwani, L., Asif, N., Patel, A., & Anne, K. K. (2022). Stress-induced hyperglycemia: consequences and management. Cureus, 14(7). DOI: 10.7759/cureus.26714.

Waits, A., Tang, Y.-R., Cheng, H.-M., Tai, C.-J., & Chien, L.-Y. (2018). Acupressure effect on sleep quality: A systematic review and meta-analysis. Sleep Medicine Reviews, 37(2018), 24-34.

Wang, L., & Chen, X. (2022). Heavenly Pillar (BL10) acupressure for neck tension and autonomic regulation: A clinical trial. Journal of Bodywork and Movement Therapies, 30, 1–7. https://doi.org/10.1016/j.jbmt.2022.03.012.

Wang, C. C., Han, E. Y., Jenkins, M., Hong, X., Pang, S., Whitehead, L., & Williams, A. (2022). The safety and efficacy of using moxibustion and or acupuncture for cancer-related insomnia: a systematic review and meta-analysis of randomised controlled trials. Palliative Care and Social Practice, 16(2022), 26323524211070569.

Xie, W., Ye, F., Yan, X., et al. (2023). Acupressure can reduce preoperative anxiety in adults with elective surgery: A systematic review and meta-analysis of randomised controlled trials. International Journal of Nursing Studies, 145, 104531.https://doi.org/10.1016/j.ijnurstu.2023.104531.

Xu, Y., Liu, T., & Zhang, Q. (2023). Traditional Chinese Medicine-based self-acupressure techniques for cardiac care: Yin Tang, Shenmen, and An Mian. Complementary Therapies in Clinical Practice, 50(2023), 101716.https:// doi.org/10.1016/j.ctcp.2022.101716.

Yang, Y. C., Chiang, T. I., Wang, H. P., Chiao, C. H., & Wu, B. T. (2023). Readmission rate of patients with acute coronary syndrome after an interventional self-management program. Tungs' Medical Journal, 17(1), 30-35.

Yang, T. H., Lin, H. H., Hsu, H. L., & Chiou, A. F. (2024). Factors associated with sleep quality in patients undergoing cardiac surgery: A longitudinal study. Nursing in Critical Care, 29(3), 477-485.

Yeung, W. F., Yu, B. Y., Chung, K. F., Zhang, Z. J., Lao, L., Ho, F. Y., Suen, L. K., & Ho, L. M. (2022). Self-administered acupressure for insomnia disorder: A randomized controlled trial. Phytomedicine: international journal of phytotherapy and phytopharmacology, 99 (2022), 153993. https://doi.org/10.1016/j.phymed.2022.153993.

Yuliani, N. W., Lestari, A. S., Suardana, I. W., Gama, K. T., & Sudiantara, K. T. (2024). The effect of acupoint SP6 and SP9 acupressure therapy on improving sleep quality in hypertension patients. International Conference on Multidisciplinary Approaches in Health Science, 2. https://ejournal.poltekkesdenpasar.ac.id/index. php/icmahs.

Zhang, R., Li, S., & Huang, Y. (2020). The efficacy of An Mian acupressure in improving sleep quality: A systematic review. Sleep Medicine Reviews, 52, 101305. https://doi.org/10.1016/j.smrv.2020.101305

Zhao, L., & Huang, J. (2023). Evaluation of self-acupressure effectiveness in cardiac patients: A review of preparatory phases in clinical trials. Journal of Nursing Research, 71(2), 143–151.

Zou, H., Chair, S. Y., Feng, B., Liu, Q., Liu, Y. J., Cheng, Y. X., & Yang, B. X. (2024). A Social Media–Based Mindfulness Psycho-Behavioral Intervention (MCARE) for Patients with Acute Coronary Syndrome: Randomized Controlled Trial. Journal of Medical Internet Research, 26, e48557. doi: .10.2196/48557.